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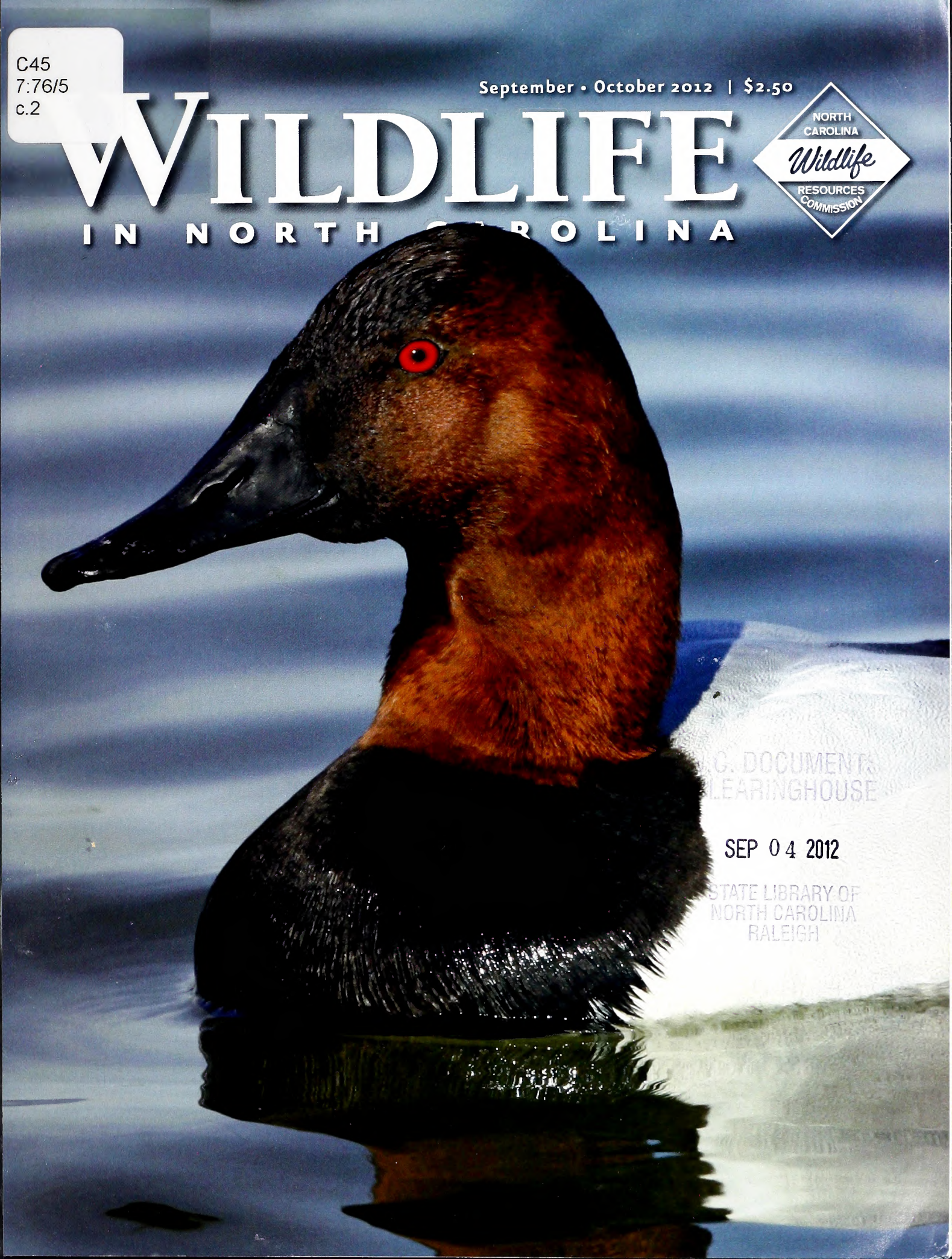
WILDLIFE IN NORTH CAROLINA

NORTH CAROLINA Wildlife RESOURCES COMMISSION



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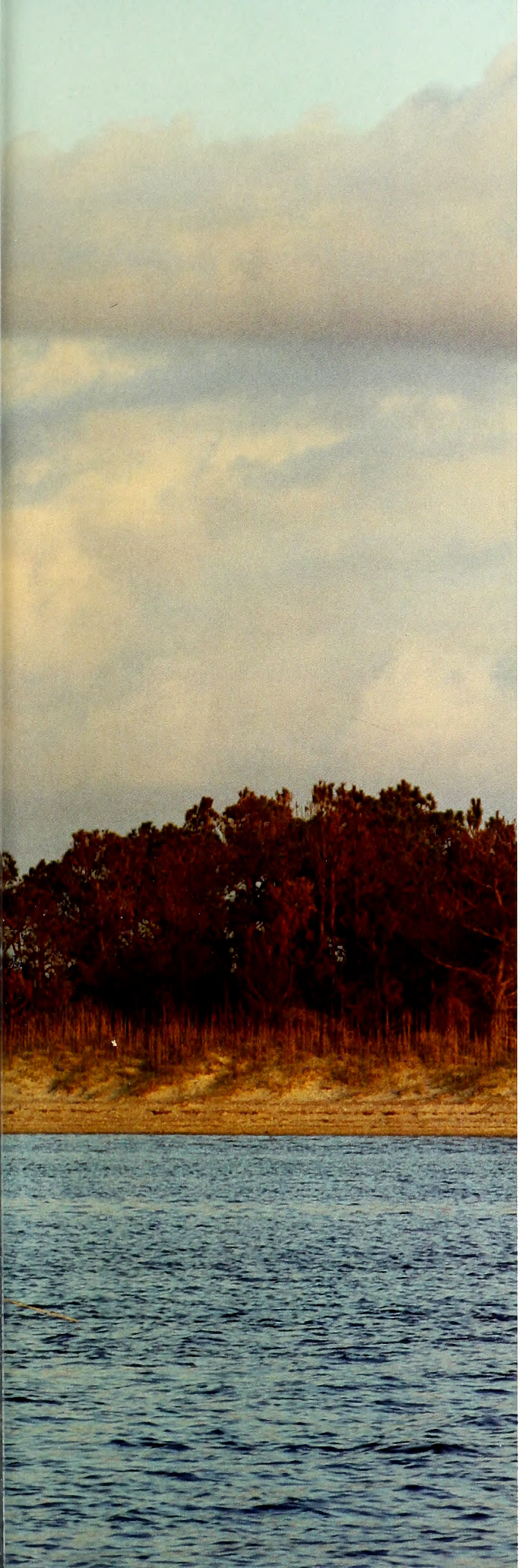
A balmy fall day is a good time to head to the coast for some inshore fishing, particularly if the Northern puffers have made their appearance in the water around Cape Lookout. **PHOTOGRAPH BY MELISSA McGAW/NCWRC.**



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Cover: Canvasback ducks, sometimes called the king of ducks, breed in the western United States, through Canada and into Alaska, but many of these large ducks spend their winters in North Carolina. PHOTOGRAPH BY F. EUGENE HESTER.

Wildlife in North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission. It is dedicated to the sound conservation of North Carolina's wildlife and other interrelated natural resources and also to the environment we share with them.

DIRECTOR'S NOTE

The year 2012 marks the 75th anniversary of the Wildlife and Sport Fish Restoration Program (WSFR), a cause for celebration among hunters, anglers and conservationists. Rightly so, for WSFR has been incredibly successful in enhancing and restoring wildlife and fish populations nationwide, making this program the single most successful conservation effort in United States history.

Beginning in 1937, federal legislation was enacted by Congress to fund grants to the states and fish and wildlife agencies for the conservation and management of wild birds, mammals and their habitats. Known as the Federal Aid in Wildlife Restoration Act (Pittman-Robertson Act), its funding strategy was to levy excise taxes on hunting and fishing equipment to be used for restoration efforts. In 1950 the Federal Aid in Sport Fish Restoration Act (Dingell-Johnson Sport Fish Restoration Act), was passed to restore and manage declining fisheries resources across the U.S. Several federal amendments have since strengthened legislation for conservation funding, notably the Wallop-Breaux Boating Trust Fund amendments in 1984, which added additional excise taxes on fishing tackle and equipment and additional import duties on yachts and pleasure craft.

WSFR has been called an excellent example of a "user-pays, user-benefits" model. In truth it is "user-pays, everyone benefits." WSFR benefits the management of game animals and sport fish but enhances the conservation of non-game species through restoration of habitats and acquisition of lands for conservation. Managing a portion of a North Carolina Wildlife Resources Commission game land for bobwhite quail, for example, also benefits a host of other species including songbirds and mammals. Restoration of trout populations by providing quality habitats in creeks and rivers benefits other aquatic species too, including species of great conservation need. WSFR funds have been used to purchase sites and fund construction and maintenance of handicap-accessible boating and fishing access areas in many areas across North Carolina. These access points are the doorways to our public waters.

This 75th anniversary year is an opportunity to reflect upon the hallmark partnership between wildlife agencies, industries, conservation groups, and our nation's sportsmen—hunters and anglers—who have taken the lead in conservation. The Wildlife and Sport Fish Restoration Program is the cornerstone and the life blood of one of the most significant and successful partnership approaches to fish and wildlife conservation in our nation's history. As we look to the next 75 years we celebrate with gratitude this successful model, which provides funding and fosters stewardship opportunities that will help ensure that our abundant and diverse wildlife resources are conserved for future generations.

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WILDLIFE IN NORTH CAROLINA

SEPTEMBER • OCTOBER 2012 VOLUME 76, NUMBER 5

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An Inspirational Owl

I really enjoyed Eugene Hester's article "The Owl and I" in your May-June issue. It has been a while since I've seen his work in *WINC*, but over the years his images have always impressed me. They have also served to inspire me in my own efforts at nature photography. I hope to see more of his work in the future.

Ed Erkes
Seven Springs

I am writing to send many thank-yous from myself in California and others I have shared "The Owl and I" with —Washington state, Ohio, Chesapeake Bay, West Virginia and just now an email appreciation to me from a friend in Santa Fe. This wonderful barred owl has traveled more miles than we knew!

Articles like this should be required educational reading. Such a small percentage of people, such as myself, have access to this kind of wildlife information. The story and dedication of Gene Hester to Hootie is so touching and his photography of both the owl and the swamp setting so close are breath-taking.

With an artistic background, I truly appreciate the stunning layout your staff did with the photographs, selection of fonts, use of sepia background and artful layout. How can we ask you for more of the same?

Lynne Hays
Oakland, Calif.

I was given a copy of the newest *Wildlife in North Carolina* recently and wanted to express how wonderful the magazine is, not only to myself but to our children. I was a subscriber years ago and decided to renew after reading this issue and the story of the owl and the beautiful pictures. The articles are well written and I am glad to see that you are able to reach to children with the story lines that so many other magazines seem to miss.

We occasionally see an owl in our neighborhood, and this article helped our children understand the beauty and inner workings of this creature. Keep up the good work and the awesome pictures. Please keep this magazine kid friendly as much as possible and also, if possible, highlight pond and small lake fishing with some tips for my son to enjoy.

Anthony Cantin
hometown withheld

Fishing Plain Plain Fun

I just received my July-August issue of *Wildlife in North Carolina* and had to respond to Jim Dean's article. Jim struck a chord that reverberated into my soul when he recounted his early fishing experiences.

I grew up in "the Rapids" a few years ahead of Jim [he was in the eighth grade when I was a high school senior] and have enjoyed his mentioning people and places I was familiar with. My dad, Charlie Speight, worked in the mills for 52 years. We knew the Dean family, and I know Jim's family knew Capt. Charlie, as he was called.

I have often said that when God made the Chowan River, he sat back and said, "I done good!" I caught my first bass there in 1945 using a Hawaiian Wiggler standing on the pier owned by Mr. Frank Williams and Jesse Harrell, colleagues of Jim's folks. My brother and William White had a cottage next to theirs. I remember racing down the Chowan in a rented wooden boat powered by a massive 5 horsepower Sea King motor. The Wiccacon, Bennett's Creek, Sarem, etc., were playgrounds.

The mention of cane poles with black line brought back another memory. Capt. Charlie was as particular about his cane pole and rigging as any big-time tournament fisherman is about his rods and reels. When in his 80s with his eyesight fading, he painted the old cork floats day-glow red, well before colored commercial floats were available. My brothers gave dad fly rods, rods and reels, but he said "If I can't see the cork go down, it ain't fishing."

I have enjoyed the magazine and Jim's articles for years. While he went on to a career that I admire and envy, I chose to fly airplanes. Jim remembers Bill Pruden and several of us who flew models back then. From an early time if I heard a plane fly over, I'd run out to look at it and say "Man, I wish I could be up there in that plane."

Times change. While in training for my second tour in Vietnam, we used the Chowan as a practice run for targets in the delta. As I was racing down the river at speeds significantly higher than with the Sea King, I'd look down, see a river boat and say, "Man, I wish I could be down there in that boat." For those of us who grew up in that idyllic time and place, we were blessed with memories never to be forgotten. Jim, I thank you for reviving some of them.

William (Bill) Speight, Lt. Col. USAF (ret.)
Hope Mills

Thank you so much for the article, "Fishing Plain." Nothing else needs to be said.

Dennis Hedgepeth
Harkers Island

We want Your Feedback

Do you have a comment about content in *Wildlife in North Carolina?* Questions about something you read or have seen? Send us an e-mail at letters@ncwildlife.org.

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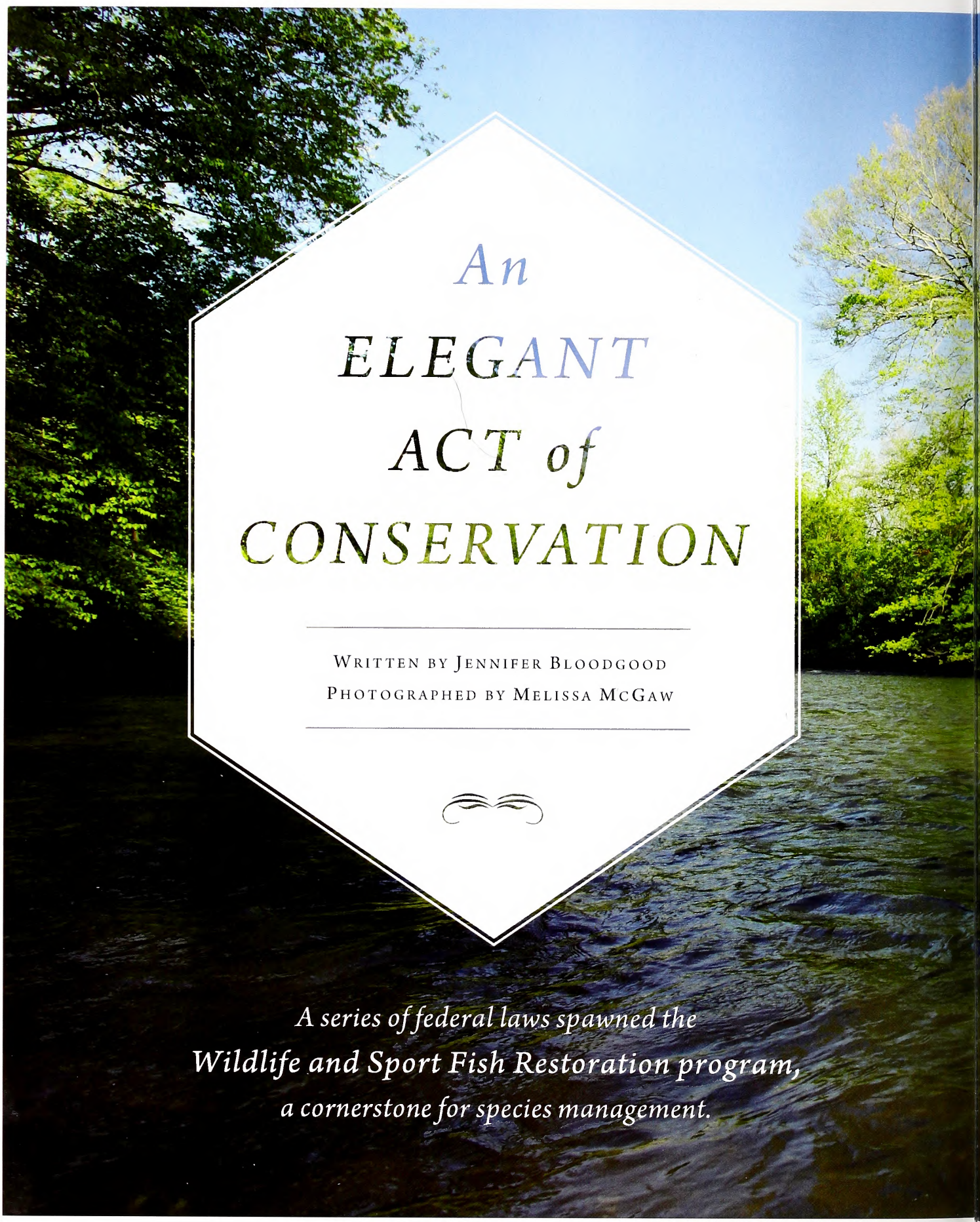

An ELEGANT ACT of CONSERVATION

WRITTEN BY JENNIFER BLOODGOOD
PHOTOGRAPHED BY MELISSA MCGAW

A series of federal laws spawned the ***Wildlife and Sport Fish Restoration program,*** *a cornerstone for species management.*

AS EARLY AS 1842, AMERICANS ADOPTED THE PRINCIPLE that wildlife resources are owned by no one and should be managed for the benefit of present and future generations. This philosophy became the basis for the North American Model of Wildlife Conservation, the only such model in the world.

In response to the realization that wildlife and fish are not limitless, a number of federal laws were passed that are still important today. These culminated in the Wildlife and Sport Fish Restoration program (WSFR), which is celebrating 75 years of success in wildlife conservation this year.

One of the first major events leading to WSFR was the enactment of the Lacey Act of 1900, a piece of legislation banning transportation across state lines of illegally taken game. The Weeks-McLean Act in 1913 established waterfowl seasons, thus eliminating spring hunting. Five years later the Migratory Bird Treaty Act was ratified, granting the federal government the right to regulate those migratory species. The Migratory Bird Hunting Stamp, commonly called the duck stamp, appeared in 1934, and the use of live decoys was banned in 1935.

Around this time, the American Game Institute (now the Wildlife Management Institute) asked Aldo Leopold and other leading conservationists, to draft a policy to guide wildlife conservation. The resulting American Game Policy called for a funding source to support wildlife management and conservation. In 1937, they got their wish.

On Sept. 2, 1937, President Franklin D. Roosevelt signed the first of two pieces of farsighted legislation: the Federal Aid in Wildlife Restoration Act (Pittman-Robertson). This was followed in 1950 by the Federal Aid in Sport Fish Restoration Act (Dingell-Johnson). Four amendments would later significantly alter this Act, including the Wallop-Breaux Boating Trust Fund Amendment of 1984.

Together these two acts form the Wildlife and Sport Fish Restoration program. The "WSFR 75 – It's Your Nature" celebration commemorates the 75th anniversary of this cooperation between federal and state fish and wildlife agencies; hunting, shooting, fishing, and boating industries; and conservation groups which has achieved what could not be realized by one organization on its own. Along the way, it has produced 75 years of quality wildlife conservation, hunting, fishing, shooting, boating and wildlife-related recreation.

The U.S. Fish and Wildlife Service (USFWS) and the Association of Fish and Wildlife Agencies (AFWA) kicked off the yearlong 75th anniversary celebration in January in Las Vegas at the 2012 SHOT Show (Shooting, Hunting, Outdoor Trade Show sponsored by the National Shooting Sports Foundation). This is not only a celebration, however, it is the start of a new era in wildlife conservation, during which all partners will work together to establish new goals for the next 75 years and beyond. These new goals will be guided by the mission of WSFR, "Working through partnerships to conserve and manage fish and wildlife and their habitats for the use and enjoyment of current and future generations." The celebration will include participation in various fish and wildlife conservation events and conferences, and will culminate with National Hunting and Fishing Day on Sept. 22.

HOW IT WORKS

If you have ever purchased a shotgun, a compound bow, or fuel for your boat, you have contributed to the success of the WSFR program. Pittman-Robertson (PR) and Dingell-Johnson (DJ) levy taxes on goods used in hunting, fishing and boating. But unlike many taxes, these have been supported by producer and consumer alike. This is mainly due to the success of the user-pay, user-benefit (or "user-pay, user-play") cycle that the program is based on—an elegantly simple and fair idea: If you don't buy hunting or fishing goods, you don't pay. By statute, all the money collected can only be used for fish, wildlife and boating.

Brad Gunn, section manager of the N.C. Wildlife Resources Commission's Division of Wildlife Management, described the program as a three-legged stool with the manufacturers, the users and the federal government each representing a leg. As he put it, "If any one of those legs disappears, then you've got a pretty unstable stool." The three legs also serve as the foundation for the program's "Cycle of Success," and as Gunn says, "It's at its most stable with all three players actively engaged in it."

The cycle of success starts with manufacturers paying excise taxes and customs duties on certain hunting and fishing goods. These taxes are collected by federal agencies, including the IRS (archery/fishing equipment and fuels), the Alcohol and Tobacco Tax and Trade Bureau (firearms and ammunition), and Customs and Border Patrol (import duties)

Excise taxes from the sales of outdoors equipment like ammunition, firearms and fishing tackle, help fund wildlife conservation and management in the U.S. The Dingell-Johnson and Pittman-Robertson acts were instrumental in this.

If you have ever purchased a shotgun, a compound bow, or fuel for your boat, you have contributed to the success of the WSFR program.

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and deposited into the Wildlife Restoration Account (PR) and the Sport Fish Restoration and Boating Trust Fund (DJ). The funds are then distributed by the U.S. Fish and Wildlife Service to state fish and wildlife agencies (such as the Wildlife Commission and the Division of Marine Fisheries) for conservation projects; distribution is based on geographical area and number of paying license holders in each state. These grants typically fund up to 75 percent of the project costs; most states provide a matching share of up to 25 percent (money usually generated through license sales). The state's project efforts result in more and better opportunities for hunters, anglers and boaters to enjoy the resources, in turn resulting in more purchases and starting the cycle all over again.

In this way, the excise taxes can be seen as an investment by the industries involved—in many ways, everybody wins. Fish and wildlife populations benefit from the ongoing management paid for with funds from WSFR, hunters and anglers benefit from the improved opportunities to hunt and fish, and industries benefit from continued and often increased sales. And nongame species profit as a result of improved management. Instead of user-pay, user-benefits, it is more user-pay, everybody-benefits.

Since its inception in 1937, WSFR has provided more than $14 billion to support fish and wildlife restoration and management. In North Carolina, these funds have been used for everything from wild turkey restoration to hatchery production of trout and other fish to the construction and maintenance of boating access areas.

PITTMAN-ROBERTSON
(Federal Aid in Wildlife Restoration Act)

Pittman-Robertson provides funds for the Wildlife Restoration Account through a dedicated excise tax on firearms, ammunition and archery equipment. The preliminary apportionment for Wildlife Restoration to the states and territories for the fiscal year 2012 was over $256 million. Based on the formulas, North Carolina received over $6.5 million. These funds can not only be allocated for reintroduction of declining wildlife species, wildlife population surveys, research and acquisition of habitat, but also for access roads and gates and signage. A dedicated amount each year is also apportioned to hunter education and shooting range enhancement.

Perhaps the best example of how PR has made an impact in North Carolina is the reintroduction of wild turkeys. By the turn of the 20th century, few turkeys remained in the once-thriving North Carolina population due to unregulated market hunting, rapid deforestation and habitat destruction. Reintroduction efforts throughout the 1950s and '60s were largely unsuccessful. Finally, North Carolina's traditional fall turkey season was closed in 1971, and a spring season was established in 1972.

Since its inception in 1937, WSFR has provided more than $14 billion to support fish and wildlife restoration and management.

This, combined with concentrated restoration efforts, brought numbers from an all-time low of only about 2,000 birds in 1970 to an estimated 130,000 birds in 2000. To understand the economic benefit of this restoration, consider some hunting statistics: In the spring of 1977, 4,800 wild turkey hunters took 144 birds in 33,000 hunting days. By 2008, 72,609 turkey hunters harvested 10,404 birds in 400,489 hunting days. The enormous increases in both hunters and days afield translate into a huge economic effect.

Another huge success for PR in North Carolina is the acreage of land acquired under the program. Over 60,000 acres have been conserved since the first piece in Pender County was obtained in 1939. The most recent acquisition was the Selma Ray Tract, a 17-acre tract in Wilkes County purchased in 2010. Technical guidance and the ongoing maintenance and management of these public lands cost even more than acquisition—all funds provided by PR. Land laid aside for wildlife is extremely important for conservation of both game and nongame species. As Gunn said, there are "benefits of wild places and wild things—a value for everybody. Even though in this case the users and manufacturers pay for it, the wildlife populations and habitat would not be anywhere near where they are today without that."

DINGELL-JOHNSON
(DJ/Federal Aid in Sport Fish Restoration Act)

While PR provides funds for wildlife, DJ focuses on fish. DJ provides funds for the Sport Fish Restoration and Boating Trust Fund through an excise tax on certain fishing and boating equipment, import duties and motorboat and small engine fuels. The Sport Fish Restoration program receives 57 percent of the funds after initial deductions. In coastal states such as ours, this amount is further split between inland and marine fisheries organizations. The preliminary apportionment of DJ funds to the states and territories for fiscal year 2012 was over $231 million. North Carolina received over $6.2 million.

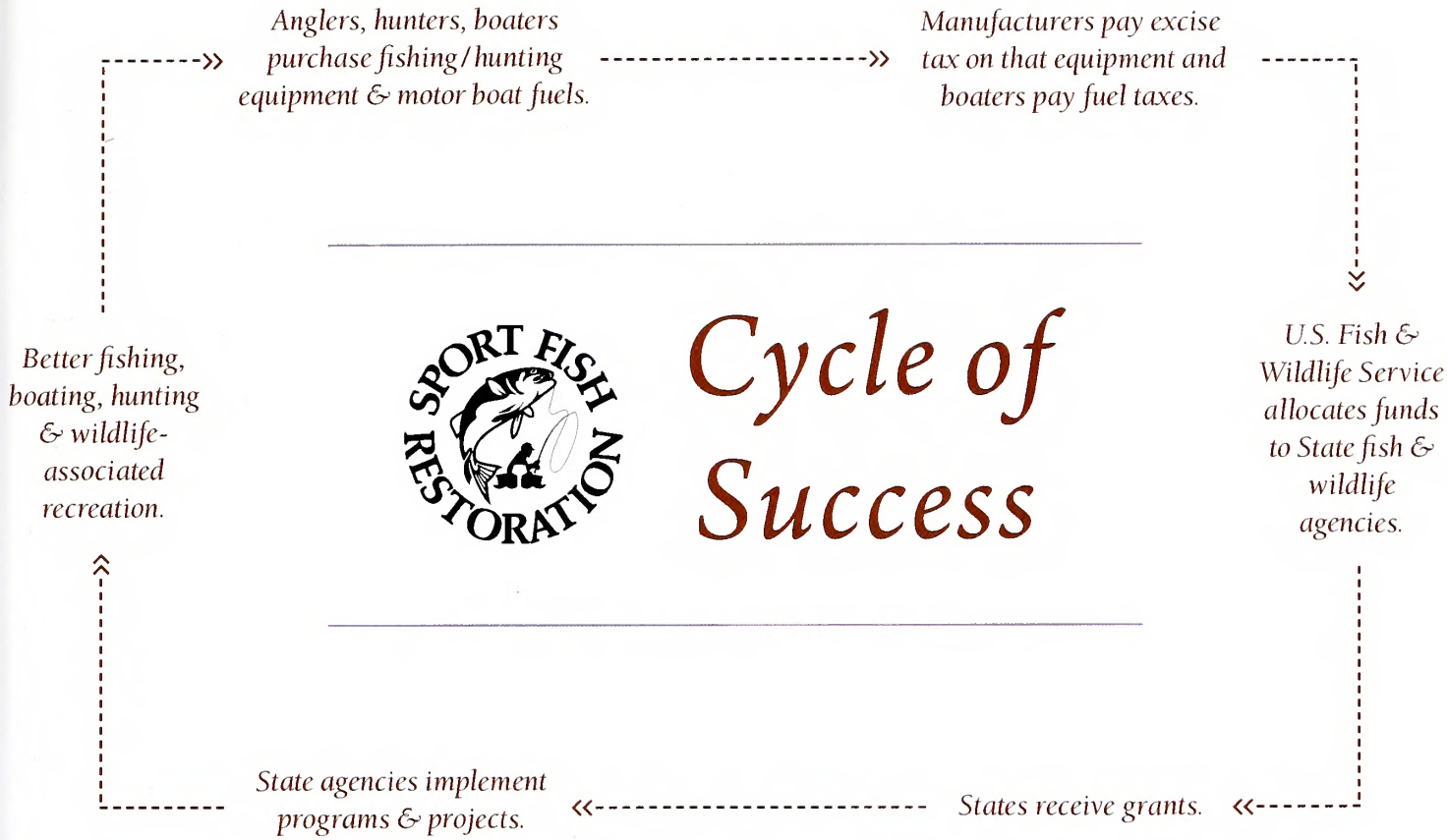
Law mandates that DJ funds may be used for fish research and surveys, reintroduction of declining sport fish species, restoration of aquatic habitat, aquatic education, construction of boat ramps and fishing piers, and boating access. Up to 15 percent of a state's total apportionment may be used for the Aquatic Resource Education Program, and states must allocate at least 15 percent to recreational boating access projects. Kyle Briggs, a program manager with the commission's Division of Inland Fisheries, said of DJ, "It's done so much—I mean, ultimately, it's provided funding for most of the fisheries management work we've done in the state. Without it, our program would be a quarter the size it is right now. The vast majority of everything that the Division of Inland Fisheries does is through SFR funds."

In fiscal year 2012, North Carolina received over $6 million in funds from the Federal Aid in Sport Fish Restoration Act, also known as the Dingell-Johnson Act.

Other major funding efforts provided for by DJ include community aquatic outreach and education.

One of the major objects of DJ funding in North Carolina has been fish hatchery renovation. From 1999 to 2009, Sport Fish Restoration money funded extensive renovations at five of the commission's six fish hatcheries, greatly increasing the commission's ability to produce a variety of fish for fishing programs, such as catchable-sized channel catfish for its Community Fishing Program sites and American shad fingerlings for the American shad restoration project on the Roanoke River.

This year the agency will stock 875,195 brook, rainbow and brown trout at a cost of about $1 million. Based on a recent economic survey, trout fishing boosts the economy of western North Carolina by $174 million annually. Fly shops, hotels, restaurants and gas stations all benefit, as do those people employed as a result of trout fishing. Of that total, $119.2 million is attributable to hatcheries. Spending $1 million to generate $119.2 million is quite a return. And most of that $1 million is funded by excise taxes on fishing gear distributed through DJ.


Anglers, hunters, boaters purchase fishing/hunting equipment & motor boat fuels.
Manufacturers pay excise tax on that equipment and boaters pay fuel taxes.
U.S. Fish & Wildlife Service allocates funds to State fish & wildlife agencies.
States receive grants.
State agencies implement programs & projects.
Better fishing, boating, hunting & wildlife-associated recreation.
SPORT FISH RESTORATION
Cycle of Success

Also thanks to DJ funds, North Carolina now boasts one of the best striped bass fisheries on the East Coast, with the restoration of the Albemarle Sound/Roanoke River striped bass population. Thanks to an aggressive striped bass management program initiated in the late 1980s, abundance of striped bass has increased from an historic low of 195,000 fish in 1988 to nearly 1 million fish today. Even though striped bass in the Roanoke were deemed recovered in 1997 and have not required stocking in the last 10 years, routine surveys and monitoring still require funds provided by DJ. "It's been a big collaborative effort and a lot of that has come directly from the funding for Sport Fish," said Christian Waters, fisheries program manager with the commission. He also elaborated, "If the striped bass fishery hadn't been restored and we weren't able to maintain the trout fisheries that we do now, there'd be a big economic loss to the state."

Other major funding efforts provided for by DJ include community aquatic outreach and education. Through the Community Fishing Program, the commission works with local parks to improve fishing opportunities in urban settings by providing reduced-cost fish stockings, fish feeders and feed, fishing piers, fish attractors and other amenities. Communities participating in the program pay 25 percent for program costs, and the commission pays the remaining 75 percent through DJ funds. In 2001, the Division of Inland Fisheries designed and built a mobile aquarium to give fisheries staff a visual aid when interacting with the public at outreach events. The mobile aquarium features two 300-gallon tanks, each equipped with separate life-support and cooling systems, allowing fisheries staff to display trout in one tank and largemouth bass and other sunfish in the other. Through Sport Fish Restoration funds, the Division of Inland Fisheries operates four education centers across the state (Pisgah, Corolla, Fayetteville and Raleigh) that offer a variety of aquatic programs and clinics designed to teach anglers of all ages, abilities and skill levels about North Carolina's aquatic resources.

HOW IT ALL ADDS UP

The next time you buy hunting or fishing goods or licenses, just remember: You are contributing to one of the greatest conservation efforts the world has ever known. The return on investment for the taxes implemented by WSFR makes every penny worth it. Thus far, hunters' purchases have helped save more than 38 million acres of America's habitat. Through license fees and excise taxes, sportsmen contribute $4.7 million per day toward conservation.

Without WSFR, this level of conservation would not exist, and who knows where America would be today—turkeys could be extinct and fishing could be an obsolete pastime. Hunters, fishermen and outdoor enthusiasts would agree with what Aldo Leopold once wrote: "I am glad I will not be young in a future without wilderness." And the WSFR program has a whole lot to do with that.

Jennifer Bloodgood works for the N.C. Museum of Natural Sciences. This is her first story for WINC.

Behind the face only a mother could love lies some of the finest eating our coast has to offer. The Northern puffer, also known as the blowtoad, frequents our coast in spring and fall, and savvy anglers follow suit.

BLOWTOAD *madness*

WRITTEN BY BILL MORRIS &
PHOTOGRAPHED BY MELISSA McGAW

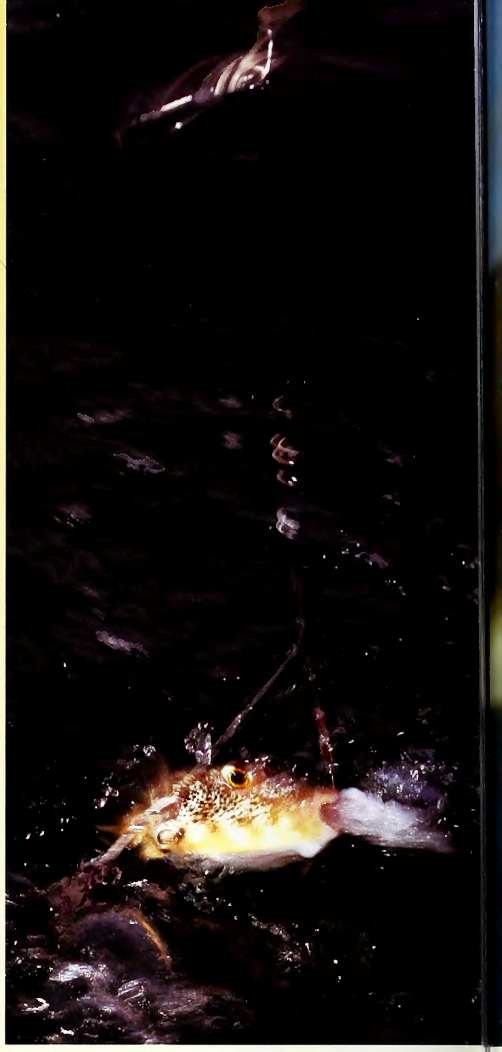
At first, second and even third glance, the puffer caught in North Carolina's sounds and from our ocean piers is one bizarre looking animal. The skin is sandpaper-rough, more like a desert reptile than a trout. Their buck teeth cry out for an orthodontist, and may be better suited to a beaver than a fish. When alarmed they gulp water or air and blow up to ridiculous proportions — good for a laugh, but also grotesque.

And then there's the story that most anglers have heard, about how puffers can be poisonous. That story turns out to be true.

And yet, every spring and fall, a small but dedicated cohort of anglers will drop two-hook bottom rigs baited with shrimp or squid, in the fervent hope of filling a cooler with puffers.

Even though these fish have evolved body parts that defy being filleted, we will stand on a dock for hours amid clouds of gnats and mosquitoes and clean them by the dozens. We will sauté the little ones, batter and fry the mediums, and cook the "roasters" in a 400-degree oven. We will vacuum-bag them until we have 50, 80, 100 portions in the freezer. We will quit only when the fish leave or we just can't stand the thought of cleaning even one more.

All of which begs the oft-heard question: "Are y'all crazy?"



Jim Strickland acknowledges as his wife Patti swings a big blowtoad aboard. A simple two-hook bottom rig baited with squid or shrimp is all you need for these tasty fish.

Yes, many people are crazy about puffers. The insanity arises because the meat along the backbone of these self-inflating, ghoulish-looking things tastes so very, very good.

"I'd rather eat a blowtoad than a steak," says Vanessa Lawrence, at the Harkers Island Fishing Center.

"Blowtoad" is one of the many common names for the Northern puffer (*Sphoeroides maculatus*), which also goes by balloonfish, bellows fish, blowfish, blower, globefish, sugar toad and sea squab. Blowtoad, however, is the name commonly used around Harkers Island, where Lawrence has lived her entire life. Like most Island families, hers caught and ate an abundance of seafood. She grew up on spots, speckled trout, shrimp, oysters and jumpin' mullet. But she was well into her 30s before she ever ate a blowtoad.

"When we were growing up, Daddy always said, 'Throw those things back.'"

Now she says she eats them three times a week when she can. Vanessa expressed her toads-over-beef preference during a conversation in March of this year, when the puffers were easy to catch inside Cape Lookout Bight.

How easy? It was March Madness, but with toads.

On March 12, Vanessa, Rob Pasfield and Stick Sandlin caught 150 that were worth taking back to the Island for cleaning. On March 17, brothers Willis and Clark Best of Straits celebrated St. Paddy's Day by catching 52 keepers in little more than an hour. On March 20, Jim and Patti Strickland and Lugean Hogan, fishing on the Stricklands' Jones Brothers Bateau *Patti Wagon,* kept 70 blowtoads. They threw back at least half that number, culling the smaller fish (generally, the males).

"I'd never even caught one before," said Hogan, holding her rod pointed high as a puffer blew up at the end of her line.

"This is just the most fun ever!"

After the unusually mild winter of 2011–12, mid-March brought clear skies and temperatures near 80 to the Carolina coast. The normal spring gales were absent, and Lookout Bight seemed to be filled with blowtoads.

Pier fishermen on the state's southern beaches were doing well, too. Al Baird, founder of the North Carolina Fishing Pier Society, filed the definitive first puffer report of the year—the catch was on New Year's Day. He shot a photo of a 5-gallon bucketful that were caught by Wilmington resident Warren Knowles on Johnny Mercer's Pier. Throughout January and February, Baird and his wife, Mary, caught puffers during several visits to Mercer's as well as the Oak Island Pier.

"I'd rather eat a blowtoad than a steak"

The annual spring spawn is the most reliable blowtoad bonanza, but there's also a fall run in the same inshore waters. Good numbers of fish can be caught in November and even early December. Northern puffers tolerate a wide range of water temperatures, from 50 to 90 degrees F, and they can be caught—though not necessarily targeted—year-round.

Puffer fishing gives even a novice angler a good chance to get hooked up. The gear required is as basic as you can get. Light spinning tackle is most commonly used, but baitcasters can work as well. Monofilament in the 10–20 pound range is fine, but braid is better for feeling the bite, which is reasonably delicate. On the business end, all that's required is the basic two-hook bottom rig available for around a dollar in any tackle shop or minimart east of Highway 17. The style with red beads seems to work best, and blowtoads will bite even the cheap-o rigs with oversized shiny snap swivels (even though this kind of underwater bling will send sea mullet into fits of laughter). If a 2-ounce pyramid or banks sinker isn't enough to hold bottom, the current is probably too strong to expect much of a puffer bite.

You will need a towel to handle the toads and a pair of pliers to de-hook them. Their diet includes all manner of shellfish, so those buck teeth are sharp and attached to powerful jaw muscles. Cheap wire hooks will catch fish, but they inevitably get bent into a pretzel

the first time you try to remove one. Use hooks that have a little backbone. Any size from No. 6 to No. 1 will do.

The best puffer baits—shrimp and squid—also attract dogfish and skates, so a long-nose set of pliers or a J-shaped de-hooking tool is a good idea. Be very careful around spiny dogfish, the ones with the spots. That spine in the tail can nail you, and the wound may be prone to infection.

This year Northern puffers were indeed plentiful, but as with any species there's no sure thing. The N.C. Division of Marine Fisheries (NCDMF) does collect harvest data on puffers, and the numbers tell a story of wild swings in landings. The recreational catch has ranged from a high of 243,570 pounds in 1992 to a low of 5,524 pounds in 2007.

In the North Carolina commercial fishery, puffers are considered bycatch. Thirty-seven years of data show a wide range in the value of the commercial catch, from a high of $58,728 in 1989 to a low of $138 in 2006.

Although they've never been an important commercial fish in North Carolina, puffers have at times been popular table fare in the Northeast, where it is sold as "sea squab." (A Tar Heel might choose to call squab, a haute Yankee delicacy, what it really is: pigeon meat.)

During World War II the puffer became an important food fish in the Northeast, as a result of meat rationing. In 1945 a record harvest of 2,120,000 pounds was recorded in the New York area. After the war the catch dropped off dramatically. During the 1970s a commercial fishery re-emerged in the Chesapeake Bay, where one year an unusually large spawning run resulted in crabbers catching them unintentionally in their pots. When brought to the surface the air-sucking puffers would inflate and literally "float" the crab pots.

The floating crab pot story was told by Dr. Louis Daniel, director of the NCDMF, during an interview in his Morehead City office. The purpose of the visit was to get an expert's response to that nagging question about whether Northern puffers are poisonous.

Do you need to be crazy to eat a blowtoad? Or is it simply helpful?

"Toxicity is not a problem with the Northern puffer," was Daniel's answer. "I have never heard of anybody having a problem after eating them. And, believe me, if there were a problem we would have heard about it over the years."

"Blowtoads are one of my favorite fish to eat," he said. "And they freeze very well."

Daniel admits getting a touch of the springtime madness himself. In his office is a photo of his wife, Ruth, proudly holding a fish she has just caught. There's no marlin in the photo. No wahoo, tuna or red drum. She is holding a puffer.

It turns out there's a genuine scientific fascination with puffers and their cousins in the order Tetradontiformes. They are among the most highly evolved of all fishes, and are some of the most mysterious creatures in the sea. The order includes about 360 species, all descended from a coral-dwelling species that emerged about 40 million years ago. Among the Northern puffer's closest relatives are triggerfish, and, in one of those bizarre tricks that evolution plays, the ocean sunfish. The largest of all boney fishes, ocean sunfish grow to 9.8 feet in length and can weigh over two tons. And yet they are closely related to the blowtoad.

NATURE'S WAYS

How Do Pufferfish Puff?

See Nature's Ways, page 43.

FILLETING A BLOWTOAD

Get a good grip on the fish and cut through the backbone just behind the head and the two small fins. Do not cut through the skin on the belly side.

Put your knife aside. Using kitchen shears, trim away the side fins before peeling back the fish's skin.

With a good grip on the meat, complete the peeling process. You should be able to pull the skin right off, leaving the tail fin as a little handle.

Finally, using your shears, trim away the dorsal fin, leaving just the tail, which provides a good handle later when eating. There are no rib bones, and the entrails will come away cleanly with the skin. All of the meat is located along the backbone, which doesn't need to be removed. Some fishermen recommend using a bent fork or a commercially made "Toad Tool." For a Toad Tool demonstration video, go to drumwagon.com.

BLOWTOAD COOKING

Your favorite recipe for frying flounder or trout will work well for a puffer. Or try these variations, courtesy of Vanessa Lawrence from Harkers Island.

BLOWTOAD RECIPES

- Make breader using equal parts self-rising flour and instant mashed potato flakes. Season with onion powder, garlic powder, pepper and salt to taste. Add cayenne, paprika or other spices if desired.
- Dip blowtoad in beaten egg, coat with the breader and deep fry at 350 degrees in vegetable or peanut oil. Cook until breader turns golden brown (about 3-5 minutes).
- Put on brown paper bag or paper towel to drain.

FOR VARIETY OR A HEALTHIER APPROACH, TRY THESE ALTERNATIVES.

- Blowtoads are also good sautéed in olive oil, with a little garlic. Lightly salt and pepper to taste.
- For larger puffers, what she calls "roasters," Vanessa recommends rolling the meat in Shake 'n Bake (parmesan crusted flavor). No battering or egg wash is needed. Bake at 400 degrees for 17 minutes.

When we hear the term "highly evolved fish," we tend to picture something sleek and wary, like a trout. Or maybe a speedy predator, like a barracuda. But scientists see things differently. In the puffer's ability to inflate itself to several times its normal size, the biologist recognizes a highly evolved defense mechanism. What looks to the fisherman like a funny gimmick is actually an effective deterrent to being eaten by larger predators. The vaguely reptilian skin is a critical part of this evolutionary adaptation. Made up of ctenoid scales (a type completely different from a drum or a trout), the blowtoad's skin is tough but extremely flexible, which makes the body inflation possible.

Toxicity itself is a highly evolved defense. The tetratodoxin (TXT) that many puffers contain is up to 1,200 times more potent than cyanide and has no known antidote. TXT makes it important to know exactly which type of puffer you are eating, and where it came from.

A 2008 paper published in *Transactions of the American Fisheries Society* backs up Daniel's opinion that our blowtoads are safe to eat. The authors wrote: "Northern puffers collected from New Jersey, Maryland and North Carolina possessed variable toxicity in visceral tissues, but no toxicity in flesh (Lynch et al. 1967; Robinson and Schwarts 1968), and those investigators considered this species safe for consumption."

It should be noted, however, that while puffers caught in North Carolina are considered safe, that is definitely not the case with different species of puffer you might catch to our south. Between January 2002 and May 2004, 28 documented cases of puffer poisoning were traced to puffers caught in the northern Indian and Banana rivers in Florida. This was by far the largest outbreak in U.S. history, and the cause was found to be not the TXT normally found in puffers, but a saxitoxin produced by some of the same species of microalgae associated with red tide events. The most toxic fish were all Southern puffers (*Sphoeroides nephelus*). Fortunately, the middle of Florida is the northern edge of that species' range.

In April 2002, the Florida Fish and Wildlife Conservation Commission banned the commercial and recreational harvesting of all puffers for the entire Indian River Lagoon.

The *American Fisheries Society* paper's authors could only speculate about why the saxitoxin suddenly began poisoning people in 2002, or why the fish in the northern section of Indian River Lagoon had more of the toxin in their flesh. But one of the conclusions they did draw should be reassuring for North Carolina anglers: "The results from this study confirmed... Northern puffers from mid-Atlantic waters possess little to no innate toxicity."

So, there you have it. Blowtoad madness isn't so crazy after all.

Bill Morris is an occasional contributor to Wildlife in North Carolina *and author of the novel, "Saltwater Cowboys."*

CURE for the Cape Fear

WRITTEN BY MIKE ZLOTNICKI // PHOTOGRAPHED BY MELISSA McGAW

The construction of rock arch fish rapids gives more anadromous fish a chance to spawn in the Cape Fear River.

Imagine a river in eastern North Carolina, flowing into the Atlantic with twists and tributaries along the route, and annual runs of American and hickory shad bring anglers to its 120 miles of turbid water. Striped bass also make their way upstream, drawing even more anglers—and their money—to towns up and down the river. River herring, a favorite of humans and piscatorial predators alike, enter the river for their spring spawning. Even endangered sturgeon—some weighing hundreds of pounds—swim upstream to spawn. Now, imagine this isn't the Roanoke River, but the Cape Fear.

One hundred years ago, anadromous fish (those which live in salt water and spawn in fresh water) had a free run up the Cape Fear in the spring. But in the early 1900s three locks and dams were constructed to aid river navigation, particularly for commercial boat traffic. The Cape Fear River Basin has over 6,000 miles of rivers and streams, and prior to the predominance of trains and trucks, boats carried a lot of freight in the region.

Today, the locks and dams are mostly artifacts from another time. The locks still move a few boats, but the dams keep thousands of anadromous fish from preferred spawning environments miles upstream. Help, however, is on the way.

In June 2011 the Army Corps of Engineers started work on rock arch rapids at Lock & Dam No. 1, about 32 miles northwest of Wilmington. When finished, this aquatic stepladder will allow fish of all species a chance to swim past the dam and farther upstream. It's essentially a ramp made out of rocks that allows fish to swim up and over the dam, and to return downstream after the spawn. It's quite a project and has been years in the making.

> "That's the best thing that ever happened to the Cape Fear," he said of the new rock arch rapids. "All the fishermen I've talked to love it. Everyone here is looking forward to it. I'm looking forward to the sturgeon coming back."

"It's a hell of a project," said Keith Ashley, District 4 fisheries biologist with the N.C. Wildlife Resources Commission. "We've been fighting this battle for 14 or 15 years. I think it's going to have some real benefit to it."

The first part of the project, funded by the American Recovery and Reinvestment Act of 2009, repaired a 40-foot-deep scour hole from almost 100 years of water and debris pouring over the low-head dam. The second part will be the rock arch rapids that stretch across the face of the dam. Over 40 of these rock arch fish rapids have been constructed in the Midwest.

I first saw the problem — and potential — first hand in 2008 when Tim Barefoot and Doug Springer of Wilmington, the late Mike Ward and Mike Wicker of Raleigh invited me to boat upstream with them to Lock & Dam No. 3, south of Fayetteville. It was on that trip that I learned about modern fish arch weirs, or fish ladders, for the Cape Fear and some about pros and cons of the locks and dams. The pros — or necessities — are that Wilmington gets its drinking water from behind No. 1, and Fayetteville gets water from behind No. 3, which makes them essential for the towns that grew up after them. (We also saw first-hand military units training for amphibious maneuvers on the river. It's quite a sight to round a river bend and happen upon a camouflage boat bristling with automatic weapons and armed warriors.) The obvious

con was the impediment the dams presented to anadromous fish. The dams also raise the level of the river about 8 to 10 feet, something locals have become accustomed to.

The corps, NCWRC and National Marine Service have tried to offset the dam by locking fish through, starting in 1961. A steep-pass fishway was installed in 1997. Since then various species have been tagged and studies have shown that a little more than half the shad and a little more than 60 percent of the striped bass make it past Lock & Dam No. 1. About 35 percent of the shad and 25 percent of the stripers make it past Lock & Dam No. 3, where the preferred spawning grounds are.

The weir is good news to anglers like Rudolph Inman of Elizabethtown. Inman, a spry 88 (which he credits to a lifetime of quail hunting and guiding) caught his first shad in 1951. He ran a service station and tackle shop in town for 37 years and still fishes every chance he can. He keeps a few shad for roe and catfish bait.

"That's the best thing that ever happened to the Cape Fear," he said of the new rock arch rapids. "All the fishermen I've talked to love it. Everyone here is looking forward to it. I'm looking forward to the sturgeon coming back."

Inman said he'd like to see rock arch rapids at all three locks. He had some other wishes as well: a fishing pier for the bank fishermen and a place to tie up boats once launched. "Some days there are 100 people fishing at Lock and Dam No. 2," he said.

Another local who is pretty psyched about the project is Matt Bierstedt of Wilmington. He's had a fish-eye view of the project as a tug boat captain hauling barges of rock from a loading trestle downriver up to the project.

"I come from a big fishing family," he said. "My dad runs the charter boat *OnMyWay* out of Carolina Beach and my brother is a big S. K. A. [Southern Kingfish Association] angler who works at the pulp mill in Riegelwood. Personally, I think it's great. We're fixing something man messed up a long time ago. I don't get to work on many things that will benefit so many people."

Bierstedt said that while offloading material he could see shad using the partially completed rapids last spring.

"I guarantee you they got twice as many shad up the river than last year," he said. "Everybody I know is excited about it. I've got ties here. It's been exciting working on it."

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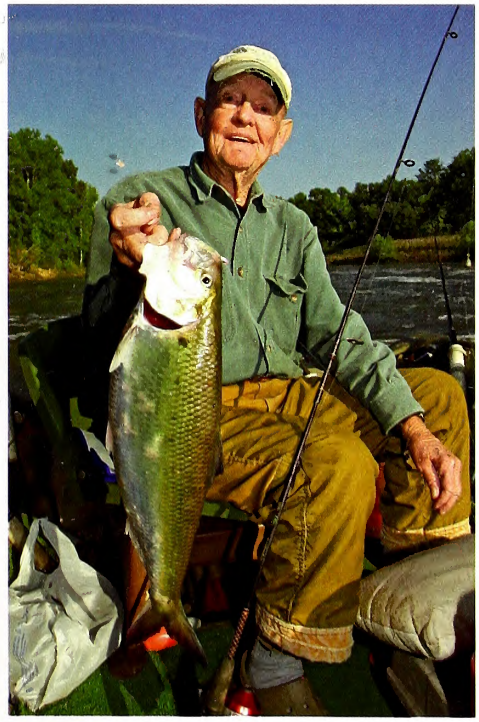
Improved fishing means more anglers. One need not look any farther north than the Roanoke River in the spring. Starting with the hickory and American shad in early March and then the world-famous striped bass run in April and May, the amount of dollars spent in places like Williamston, Jamesville and especially Roanoke Rapids and Weldon is significant. During the harvest season for striped bass the river downstream from Weldon is a mosh pit of boats

From opposite page, left: An excavator from Cape Romain Contractors is used to move the heavy boulders that comprise the rock arch rapids; Rudolph Inman of Elizabethtown is a veteran shad angler and looks forward to seeing the sturgeon thrive in the Cape Fear; Matt Bierstedt comes from a fishing family and hauled barges of rock during the construction of the project. He is excited about participating in the project.



ranging from canoes to cabin cruisers. One-hundred fish days are not uncommon. Last spring commission biologists sampled a little over 2,600 striped bass on the Roanoke by electrofishing. The majority were under 10 pounds, but 66 were over 30 pounds, including four over 50 pounds. According to Chad Thomas, coastal region fisheries supervisor, staff averaged 16–17 hour days on the Roanoke sampling stripers between March and June.

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CASH COWS. That kind of fishery draws crowds, and crowds mean money. The commission did creel surveys of anglers on the Cape Fear (2003–2004) and the Roanoke (2005–2006), essentially visiting various boating access areas and doing quick interviews with departing anglers about their trip experience. Cape Fear trip expenditures (fuel, bait and food) averaged $20.84 a trip or $392,777 annually. Catfish and shad were the primary species sought. Roanoke River expenditures (fuel, bait, food and lodging) were $93.44 per trip or $2,545,460 annually, and the primary species then were striped bass and largemouth bass. The largemouth fishery is mostly locals, but people come from all over the nation to fish for the stripers. It should be noted that these figures do not include any economic multipliers and are probably on the conservative side. Last spring I fished the Roanoke with a buddy, and we spent $66 on live shad and shiners. Throw in fuel, drinks, tackle, Nabs and pork skins and our tab was over $100 and we day-tripped it.

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CAPE FEAR POTENTIAL. Joe Hightower, fisheries biologist with the U.S. Geological Survey, and Chip Collier, a biologist with NCDMF, have done population estimates and forecasted population potential based in part on historical landings. The river should support 100,000 striped bass; currently about 10,000 are present. Atlantic sturgeon (fewer than 1,000) and shortnose sturgeon (fewer than 100 presently) could number about 8,000 and 31,000, respectively. Based on historical landings, the Cape Fear could support 2.3 million river herring. There are no current population estimates, but Hightower said the current population is "far below target levels." American shad target levels are 450,000 for the Cape Fear and Northeast Cape Fear rivers.

What happens to fish in the Cape Fear matters to the local environment and economies, but also has far-reaching effects. Shad, for example, are prey for larger species like striped bass. In the case of the American shad, they range as far north as the Bay of Fundy between Nova Scotia and New Brunswick and as far south as Florida. They remain in the ocean two to six years before becoming sexually mature.

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WHAT'S NEXT? The rock arch rapids at Lock & Dam No. 1 should be completed by January, but last spring spawning fish made it over the partially completed structure.

"From the sonic tagging study that DMF [Division of Marine Fisheries] conducted this spring on the partially completed structure we already know that three American shad and two striped bass used the rapids to pass upstream," said Ashley. "I'm very excited about the potential this structure has for getting anadromous fish upstream to their historical spawning grounds. I think once the structure is completed, and provided we have normal spring flows next year, a lot more shad and striped bass are going to be making their way upstream over this structure. Now, if we can only get something in place at lock and dams 2 and 3, we will be well on our way to restoring these populations to historical levels."

Unfortunately, funding is not in place at this time for the other two barriers on the Cape Fear, and the best spawning habitat for the striped bass is above Lock and Dam No. 3 near Fayetteville. Building rock arch rapids at No. 2 and No. 3 would be much less costly—around $7 million each—because fewer repairs would be needed. One bonus Wicker brought up with the rock arch fish rapids is that drownings at the base of dams will be negated. No one knows what the future holds, but the current structure at Lock & Dam No. 1 is a huge first step for the anadromous species of the Cape Fear, and also for the communities that stand to benefit from a better river.

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Help for the Sturgeons

Clockwise from top left: John Perry, an intern with the Division of Marine Fisheries, and Joe Facendola, fisheries technician II with the Division of Marine Fisheries, tend a gill net used in sturgeon sampling; Facendola measures a juvenile sturgeon; An anchor tag with information unique to each fish is affixed before release. Opposite page: commission biologists Keith Ashley and Tom Rachels sample shad on the Cape Fear.

TWO SPECIES SET TO BENEFIT GREATLY from the rock arch fish rapids are the Atlantic sturgeon and the shortnose sturgeon. Sturgeons are primitive fish with origins dating back 120 million years. They have declined drastically in the 20th century.

The Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) is a long-lived, estuarine dependent, anadromous fish. Atlantic sturgeon can grow to approximately 14 feet long and can weigh up to 800 pounds. They are bluish-black or olive brown dorsally, with paler sides and a white belly. They have five major rows of dermal scutes. Atlantic sturgeon are similar in appearance to shortnose sturgeon, but can be distinguished by their larger size, smaller mouth, different snout shape and scutes. Atlantic sturgeons have been aged to 60 years.

The shortnose sturgeon (*Acipenser brevirostrum*) is the smallest of the three sturgeon species that occur in eastern North America: they attain a maximum length of about 6 feet, and a weight of about 55 lbs. Adults are often confused with the similar-sized juvenile Atlantic sturgeon that historically co-occurred in the lower mainstem rivers of major basins along the Atlantic coast. The geographic range of the shortnose sturgeon is from the Saint John River, New Brunswick, Canada, to the St. Johns River in Florida.

Bennett Wynne is the commission's anadromous fish coordinator for the Division of Inland Fisheries.

"Shortnose and Atlantic sturgeon populations in the Cape Fear River are still severely depressed compared to historic, pre-lock and dam levels, he said. "However, preliminary results from the sturgeon Section 6 acoustic tagging study that Chip Collier of DMF [N.C. Division of Marine Fisheries] is conducting indicate decent numbers of sub-adult Atlantics occur in key areas of the lower Cape Fear, and a gravid female shortnose sturgeon was collected in January of 2012. This is a good sign that remnant sturgeon populations occur in the river, but it is still not clear whether the Atlantics collected and tagged were spawned in the Cape Fear, or spawned in another river system and just moved to the Cape Fear for forage, water quality or other reasons."

Wynne said that as the Section 6 study continues to move forward, they expect it will shed light on the origins and movements of these fish. "Construction of the rock arch rapids, together with the information gained from the Section 6 work, sets the stage for sturgeon recovery in the Cape Fear Basin," Wynne said. "The rock rapids at Lock & Dam No. 1 will give sturgeon much more access to the mainstem Cape Fear, but lock and dams 2 and 3 will still block access to historic anadromous spawning grounds in Harnett County."

Wynne said that they may soon find that sturgeon spawn on the new rock rapids itself, move upstream to Lock & Dam No. 2, that some sturgeon spawning is occurring in tidal freshwater reaches of the river having hard bottom, or that currently most sturgeon in the Cape Fear are visitors from other river systems — any one of which is a huge improvement in the state of our knowledge of these fish. "One thing is already certain — great strides are being made toward sturgeon recovery in the Cape Fear River," he said.

North Carolina Hunting Seasons 2012–2013

SPECIES		HUNTING SEASON	DAILY LIMIT	POSSESSION	SEASON
BLACK BEAR		See *Regulations Digest, P. 45*	1	1	1
DEER[1]			6	6[2]	6[2]
	Archery	Sept. 8–Sept. 28 (Eastern) Sept. 10–Sept. 29 and Oct. 15–Nov. 17 (Western) Sept. 8–Oct. 26 (Central) Sept. 8–Nov. 2 (Northwestern)			
	Muzzleloading	Sept. 29–Oct. 12 (Eastern) Oct. 1–Oct. 13 (Western) Oct. 27–Nov. 9 (Central) Nov. 3–Nov. 16 (Northwestern)			
	Gun	Oct. 13–Jan. 1 (Eastern) Nov. 19–Dec. 8 (Western) Nov. 10–Jan. 1 (Central) Nov. 17–Jan. 1 (Northwestern)			
	Urban Archery Season	Jan. 12–Feb. 16	See *Regulations Digest P. 55.*		
WILD TURKEY	Male Or Bearded Only Youth Hunt (Male Or Bearded Only)	April 13–May 11 April 6	1 1	2 *(Annual bag limit is 2 wild turkeys.)*	2
EARLY CANADA GOOSE SEASON		Sept. 1–Sept. 29[3]	15	30	None
DOVE	(Mourning & White-winged)	Sept. 1–Oct. 6 (shooting hours are ½ hour before sunrise until sunset) Nov. 19–Nov. 24 Dec. 15–Jan. 11	15	30	None

SPECIES		HUNTING SEASON	DAILY LIMIT	POSSESSION	SEASON
RAILS, MOORHEN & GALLINULE	Moorhen & Gallinule	Sept. 1–Nov. 9	15	30	None
	Clapper Rail, King Rail	Sept. 1–Nov. 9	15	30	None
	Sora Rail, Virginia Rail	Sept. 1–Nov. 9	25	25	None
EARLY TEAL SEASON[4]		Sept. 8–Sept. 26 (east of U.S. 17 only)	4	8	None
COMMON SNIPE		Nov. 14–Feb. 28	8	16	None
WOODCOCK		Dec. 13–Jan. 26	3	6	None
RED & GRAY SQUIRREL		Oct. 15–Feb. 28	8	None	None
FOX SQUIRREL		Oct. 15–Dec. 31 (only in 23 counties; season closed elsewhere; see *Regulations Digest, P. 57*)	1	2	10
RABBIT Including Box Trapping		Nov. 17–Feb. 28	5	None	None
QUAIL		Nov. 17–Feb. 28	6	12	None
RUFFED GROUSE		Oct. 15–Feb. 28	3	6	30
PHEASANT Male Pheasant Only		Nov. 17–Feb. 1	3	6	30
RACCOON & OPOSSUM[5]		Oct. 15 (sunrise)–Feb. 28	No restriction on opossum; see *Regulations Digest, P. 57*, for raccoon.		
BOBCAT[5]		Oct. 15–Feb. 28	No restriction.		
FOX		Nov. 17–Jan. 1 and Jan. 5–Jan. 26	Limited to certain counties, see *Regulations Digest, P. 57.*		
MIGRATORY WATERFOWL		Federal regulations may be obtained at ncwildlife.org or by calling toll free 1-800-675-0263 after Labor Day.			
COYOTE		No closed season or bag limits. Electronic calls allowed.			
GROUNDHOG		No closed season or bag limits.			
NUTRIA		No closed season or bag limits.			
BEAVER		See *Regulations Digest, P. 57.*			
CROW		Wed., Fri., Sat. of each week from Aug. 1, 2012 through Feb. 28 and June 5, 2013 through July 31, 2013. See *Regulations Digest, P. 59*, for additional holiday hunts. No bag limits.			
STRIPED SKUNK		No closed season or bag limits.			
ARMADILLO		No closed season or bag limits.			
FERAL SWINE		No closed season or bag limits.			

[1] See *2012–2013 North Carolina Inland Fishing, Hunting & Trapping Regulations Digest* for approximate boundaries of Eastern, Central, Northwestern and Western deer seasons. For a copy of the *Regulations Digest*, write: N.C. Wildlife Resources Commission, 1722 Mail Service Center, Raleigh, NC 27699-1722 or visit ncwildlife.org.

[2] See *Regulations Digest* Ps. 46 and 55 for buck bag limits.

[3] West of U.S. 17, shooting hours are extended to one-half hour after sunset, and electronic calls and unplugged shotguns may be used.

[4] Includes blue-winged, green-winged and cinnamon teal.

[5] The bobcat, raccoon and opossum seasons are closed in the Harmon Den and Sherwood bear sanctuaries in Haywood County.

[6] Visit ncwildlife.org for updates on hunting coyotes and feral swine at night.

NORTH HAMPTON HILTON

WRITTEN BY REBECCA POWELL × ILLUSTRATED BY GARY PALMER

Editor's Note: Just as young hunters and fishermen need encouragement, so do young writers. To further that end, Wildlife in North Carolina *is running three stories from youthful authors in consecutive issues.*

The third and final author in the series, Rebecca Powell, writes poignantly of her days at a deer camp with her dad and his friends. Rebecca is 17 years old and a student at Ravenscroft High School in Raleigh. Of herself, she says: "I live on a small farm with my parents, my little sister Michelle, my grandma, three dogs, two cats, and seven chickens. I've always loved hearing my dad's friends tell stories at the hunting camp, and now I'm telling my own story."

As you will discover when you read Rebecca's story, the hunting camp has been sold, but the experiences, the memories and the lessons she learned will be forever with her.

Enjoy Rebecca's story. It might remind you of your own days in the woods and fields.

—Jim Wilson

IN WHAT'S CONSIDERED A MALE DOMAIN, A GIRL DISCOVERS A PERFECT PIECE OF CHILDHOOD.

The icy air stabbed at my face as the four-wheeler shot forward. My toes were numb after two hours of sitting in the deer stand without seeing a thing. The sun was just rising—not yet wakeful enough to emit any heat. My dad rode ahead of me, carefully showing me the way through the swamp. I longed to be at the house already, sitting by the portable heater. As a young girl, I did not have much patience—to my father's dismay. Trying to keep a 10-year-old both still and quiet while hunting in the middle of January is quite a task.

I HAD SHOT MY DAD'S GUN WITH PERFECT ACCURACY. I HAD OVERCOME MY FEARS AND SUCCEEDED!

When we topped the hill I could see the little cabin in the distance and I automatically pushed the accelerator harder with my frozen thumb. As we pulled up, the mismatched siding greeted me with the promise of warmth. Icicles hung from the gutters, winking in the budding light. I turned off the ignition and hobbled as quickly as possible to the crooked wooden door, my many layers of clothing weighing me down.

As I entered the room, a blast of warm air bombarded me, causing my frozen skin to sting. I threw my wet gloves and neon-orange hat on the couch to my left and began thawing myself by the heater. Around the tiny room, six bunk beds were arranged against the walls. The faded wooden floor was plagued with dirt and an array of camouflage clothing. In front of the couch rested a small coffee table and an ugly worn chair. The only things adorning the walls were a clock, a picture of a buck, and a few head mounts hanging above the entrance to the kitchen. A feeling of familiarity swathed everything.

Upon entering the kitchen, the aroma of breakfast heightened my senses. The room was relatively small and bare as well. The hunting club, or "the North Hampton Hilton" as we referred to it, was not a lavish place. Rounding the small dining table, I approached the dehydrated sink. A few weeks before we had arrived, the well had dried up. A cooler of water had been trained as an understudy: not nearly as desirable, yet still acceptable. Dousing my hands with soap, I quickly washed them in the clean, icy bath and grabbed a paper plate.

My dad's friend, Butch, offered me one of his famous black-bottom biscuits. I immediately accepted and took a bite. The fluffy delicacy dissolved on my tongue, instantly filling me with warmth like the campfire from last night. The spicy link sausage complemented the heavenly flavors and enlightened my taste buds. My father loudly began describing our uneventful morning excursion to the others, and I could hear bacon searing in the pan on the stove.

A slight draft entered from the bathroom, the only other room in the small haven. Its plywood walls invited the chilly winter air. Another cooler of water stood guard by the dry toilet bowl. To flush, you had to pour water into the back compartment. The hunting club was not the typical location for a young lady. Those were my exact sentiments the first time I arrived. Eventually, however, I became attached to it as I discovered the pleasure of listening to stories around the camp fire and using soda cans for target practice.

On one occasion, my dad allowed me to shoot his gun. My arm was supported by the cushioned seat of the parked four-wheeler. The can sat 20 feet away, an easy target. I was scared, but Daddy had promised that the gun would not kick too hard. Coming from a 6-foot, 200-pound man, this gave me little comfort. I focused the crosshairs on the object and, once they were perfectly aligned, I gently squeezed the trigger.

The gun ricocheted off of my petite shoulder, nearly sending me airborne. As I regained consciousness, I felt an intense ache where the butt of the gun had assaulted me like an angry ram. I glared at my father, but his face was illuminated with delight. In his hand rested the devastated aluminum can, a gaping hole slashed through the center. I, too, began to feel proud of myself. I had shot my dad's gun with perfect accuracy. I had overcome my fears and succeeded! However, the most important lesson I learned that day was that a 90-pound girl should never shoot a grown man's gun.

Now that we have sold the North Hampton Hilton, my only souvenirs are memories held close to my heart. I can clearly recall the acrid smell of the marsh, and the opposing aroma of a Thanksgiving meal. I can remember the pleasant rays of sunshine dancing upon the surface of a small, glittering stream and the bleak, barren fields of icy winter. All of these things, I associate with one place — one large contradiction.

Thinking back arouses a concoction of various emotions. I feel grateful for my wonderful past experiences, yet also melancholy and a bit strange. It definitely wasn't an average place. The North Hampton Hilton was a retreat — it gave me the opportunity to forget my societal obligations and worries. Even as a child, yet to be exposed to "grown-up" issues, I had my regular household chores and naïve concerns. The hunting club was an escape from the restricting rules of city life. Manners didn't matter quite so much anymore, and it was as if I was allowed to finally be myself. No one would judge me if I didn't eat with my napkin folded on my lap, and I was freed from the scrutiny of my peers and harsh self-judgment. At the core of my childhood, I was carefree and innocent; just the way things should be. ◆

Animal MAGNETISM

Mariners used sextants for celestial navigation. Do birds and animals also look to the sky during migrations? Questions still remain about animal migration.

Written by Jared Lloyd

Food and reproduction are the reasons, but the how of migrations remains largely unknown.

The nighttime sky was aglow from the impossible number of stars. The Milky Way, though always visible along this stretch of the barrier island, unfurled across the heavens with such brilliance as to force you to stop and take notice. Temperatures had plunged throughout the day signifying a cold air mass was moving through. The world was still. Creatures big and small were conserving heat and energy. Yet overhead, there were the unmistakable calls of tundra swans. Under the cover of darkness they flew, pushing their way south from the Arctic, a voyage their species has made since the dawn of their existence.

For several weeks now, the numbers of birds on the island had swollen to mind-bending proportions. Hawks, falcons, passerines (song birds), shore birds, you name it, they were moving south. Day after day I watched as a seemingly endless string of double-crested cormorants worked their way down the coastline. Even the humpback whales were beginning to make an appearance. The fall migration was in full swing.

Migration is one of the most basic of instincts for many species. Witnessed on every continent, in every ocean, the seasonal movements of animals is one of the most profound phenomena to occur on Earth. At first glance however, it seems like a relatively simple concept. Broken down, migration is all about food and sex. What else would be so pressing, so demanding, that animals would routinely undertake such a costly, and statistically deadly journey? Migration is survival. It is the continuation of oneself, and the continuation of one's species.

TODD PUSSER

Deep within these birds lies a natural compass rotating continuously to keep track of the magnetic poles.

What causes animals to migrate is easy enough to explain. How exactly animals manage to do this on the other hand, is the knot in the stomach of some researchers that keeps them awake at night. Birds navigate across continents, whales across open oceans, even insects like the monarch butterfly undertake monumental journeys with such precision as to have baffled humans for centuries. The ability of these creatures to navigate back and forth over thousands of miles along the same routes that their ancestors have for time unknown, is the profundity of migration.

Soaring far above the world of terra firma, the tundra swans that call out above my house at night are undergoing an arduous round trip of some 6,000 miles. These birds are most likely on their way to Lake Mattamuskeet where they will spend the winter. The largest natural lake in the state of North Carolina, some 17 miles wide and 9 miles across, the average depth of this lake is only 2 to 3 feet. Mattamuskeet for this reason is the mecca of North America's eastern tundra swans. With as many as 35,000 swans present by December, this lake is home to one of the South's great wildlife spectacles. Drawn by an abundance of food, these birds congregate in mass upon these waters to both feed, and to select a mate for the coming spring. For a swan to find this single location, though, is an act of navigational perfection that requires a mastery of the natural forces present throughout our world.

Traveling by day allows for the use of landmarks, the positioning of the sun and the polarity of the sky as navigational aids. Traveling by night, there are the stars to find your way by, much as the old mariners traveled across the oceans. These are not foolproof methods, however. What of clouds and storms, when land and sky becomes obscured? There are an infinite number of variables working against these sorts of visual cues, and likewise there are an infinite number of things that can go wrong.

To successfully complete a journey of this magnitude, a more reliable plan of action must be put into place. For these swans, as is the case with all species of migratory birds, one of the secrets to their success lies within their beaks. As the old saying goes, "follow your nose." These birds do just that. Collected inside of the beaks of migrants lies an almost alien-like iron ore known as magnetite. When found inside of animals, this mineral is more appropriately termed biogenic magnetite, and the deposits of this stuff are permanently magnetized bars that align themselves with magnetic north. Deep within these birds lies a natural compass rotating continuously to keep track of the positions of the magnetic poles.

All said and done, our planet is really just one big magnet, and the magnetic field that radiates out of the poles can be perceived in the air, on land, and deep beneath the surface of the vastness of our oceans. This field is a constant. It is there day and night, in stormy weather and blue skies. The ability to tune into this geomagnetic field, therefore, offers an unsurpassed ability for many species to navigate the world abroad.

Tundra swans, top, literally "follow their noses" when migrating. Their beaks have magnetite that helps align them with the poles. Ospreys on the Outer Banks will migrate to Central America, returning after two years in the tropics.

Birds, as it turns out, are not the only creatures to possess this biogenic magnetite. Whales have it; sea turtles have it; many different species of mammals, amphibians, lobsters and even humans all contain deposits of this magnetic mineral in crystal-like form. For most species, like humans and sea turtles, magnetite is found within the brain. The neurobiological reaction that occurs here to create the perception of direction, however, is still for the most part sparsely understood. It's like a rabbit hole. The closer you look the deeper it goes. The answer to one question only elicits more questions.

Case in point, the loggerhead sea turtle undergoes one of the most dramatic of migrations on Earth. Upon hatching, the young turtles orient themselves straight toward the Gulf Stream many miles off the coast. From here, a turtle will spend roughly the next 10 years of its life being swept around the Atlantic ocean in the clockwise rotation of currents of the North Atlantic Gyre, for which the famed Gulf Stream is only the western boundary. Tens of thousands of miles of travel and nearly a decade later, these turtles begin to reappear off the coast of the United States. When it finally comes time for the females to lay their eggs, they will most often return back to the same beaches they themselves once hatched from some 30 years before.

Ospreys, one of the most successful birds of prey on Earth, also show this incredible behavior of returning to their natal homes. Upon migrating south in the fall, the ospreys that call the Outer Banks home will undertake their journey to Central America at break-neck speeds. Once arriving in places such as Venezuela, that year's fledglings will then spend the next two years of their lives in the tropics where they mature

The canvasbacks' breeding range is in parts of the Western U.S. into central Canada to Alaska, but the birds winter as far south as Mexico. (A scaup is pictured as well.)

JARED LLOYD

From top right: snow geese, monarch butterflies, loggerhead turtles and humpback whales all migrate.

and find their mate that they will stick with for life. After their two-year foray in tropical bliss, these birds will then once again find their way back to this very sandbar where they were born. Each year following, they will undergo this same monumental journey south once again, only to return in the spring, not just to these islands, but to the very nest from which they left the previous fall.

To be able to pinpoint a location such as the osprey, loggerhead sea turtles, and tundra swans do, these creatures need more than just a compass. The knowledge of which direction is north and south will only point you in the general direction. Like trying to give directions to my house on the Outer Banks, you need more information than just simply knowing that I live north of Mexico.

As it turns out, the Earth's magnetic field is quite complex and every place on this planet has its own unique magnetic signature or address, if you will. Cape Hatteras National Seashore will therefore have a completely different magnetic address than say, Bermuda or Lake Mattamuskeet. Thus many species are not only able to perceive this geomagnetic field, they are also able to discern the subtle variations in its pulse and intensity. These variations are the signatures that locations can then be mentally mapped by.

Sea turtles' unique behavior of returning to their natal beaches or birthplaces after so many years absent, much like salmon, has given these oceanic reptiles top priority in terms of studying magnetic orientation. Dr. Kenneth Lohmann of UNC-Chapel Hill, a researcher whose name is almost inextricable from the literature on geomagnetism in sea turtles, has done extensive research on loggerhead turtles in the coastal waters of North Carolina and the rest of the Southeast.

Lohmann has shown repeatedly that loggerhead turtles are not only able to align themselves with the magnetic poles, but also to read the variations in the geomagnetic field so as to orient themselves throughout the oceans. In one of his more renowned experiments, Lohmann placed loggerhead hatchlings into an artificial pool that allowed him to replicate the magnetic field. As loggerhead hatchlings orient themselves toward the Gulf Stream, in which they live out the first decade of their lives floating around the Sargasso Sea, Lohmann's experiments were designed to discern whether or not hatchlings would orient themselves toward this gyre despite his manipulation of the geomagnetic signature replicating various locations on the eastern seaboard. By controlling the magnetic field in the pool, Lohmann was

The ability of these creatures to navigate back and forth over thousands of miles along the same routes that their ancestors have for time unknown, is the profundity of migration.

able to emulate the magnetic signature of areas south, north and east of the North Atlantic Gyre. With each change in the magnetic field, the hatchlings responded in fashion by swimming toward where the gyre would be in relation to their current magnetic address. The implications of these findings cannot be overstressed. GPS has been around for a very long time.

With life beginning in the primordial soup that was the oceans of our planet nearly 4 billion years ago, it would only make sense that such use of the geomagnetic field would first evolve beneath the ocean. This may be why magnetoreception is so widespread amongst pelagic (open ocean) species. With little in the form of visual cues to utilize for migrating vast distances through seas, the ability for animals to tap into the one global constant could be the difference between finding seasonally available food sources, and wandering aimlessly in the vast abyss towards starvation.

Upon land, though, magnetoreception begins to take on unique twists. As terrestrial life is the evolutionary offspring of this aquatic world, many air breathers have inherited such abilities and then some. The problem with our ability to single out exactly how creatures are tapping into this magnetic field has been that the literature is confounded by the fact that many researchers find distinct and unexplainable links to vision in migration. As noted above, there are always the stars and major geographic landmarks to guide the observant migrant across the land, but what of those that cannot see such landmarks? What of those who have never had the opportunity to see such landmarks, why are light and vision seemingly still playing a role?

Nearly 40 years ago, Klaus Schulten of the University of Illinois made a radical proposal that migratory birds may actually see the lines of the Earth's magnetic field. For such claims, Schulten was laughed at by some and ignored by others. For those that did think that he might be onto something, though, they could never prove such a link. The problem was that researchers just couldn't find a chemical present in the optical system of birds, or any other animals for that matter, sensitive enough to actually be influenced by the subtle geomagnetic field. That is, until researcher Peter Hore of Oxford University discovered that chryptochrome, a light sensitive protein in the retinal neurons of bird's eyes, was in fact sensitive to weak magnetism.

Research on robins has now shown that not only are these birds visually responding to the Earth's magnetic field but that they are able to actually see the magnetic lines of this field in living color. Experiments have shown time and time again that this ability to "see" the magnetic field is specifically related only to the right eye of birds, for when they are covered or a frosted lens is placed over top of that eye, the birds distinctly lose their orientation ability. The right eye therefore functions as something of a gateway for these birds' magnetoreception.

One aspect of these findings that has sparked curiosities all over the world, is the fact that chryptochromes are present in the eyes of humans as well. This naturally leads us to question why we do not see the lines of the geomagnetic field? Chryptochromes it turns out rely upon free radicals—those pesky things that speed up aging, cause cancer and fuel multi-million-dollar marketing campaigns to advertise antioxidants on cereal boxes. And for magnetoreception, chryptochromes specifically require the free radical known as superoxide. Humans, however, naturally produce an enzyme known as superoxide dismutase for searching out and destroying this stuff. So it would seem that over the course of human evolution we traded our own magnetoreception and ability to perceive the Earth's field for a longer life span.

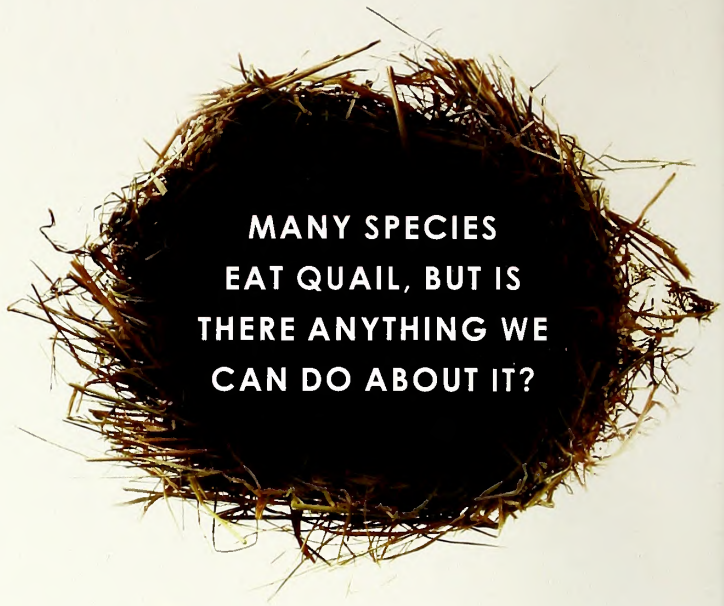
This revelation of the function of chryptochromes has simply blown the roof off of the study of migration. Thousands of species of birds across the globe are considered migratory. Do chryptochromes function similarly in all of these species? What of the biogenic magnetite that is known to be present in these species and how does it play a role if birds can simply see the magnetic field? Those species that never left the ocean have of course inherited the ability of orientation from their ancestors, but what of those species that left the terrestrial lifestyle for one in the ocean blue? Whales, sea turtles, seals... what allows for these creatures to locate themselves at all times across some sort of geomagnetic map? Like I said—rabbit hole.

Since the days when the famed naturalist Aristotle theorized migration was nothing more than birds hibernating underground like some sort of winged member of the tribe of bears, humans have groped for understanding of the phenomena that is migration. Today, however, our desire to understand the mechanics behind migration goes far beyond simple fascination. Researchers are now realizing that the understanding of the movement of animals is going to play one of the most critical roles for protecting and insuring the continuation of these species in the future. It no longer simply suffices to know where animals are coming from and where they are going. How they manage these feats and what our civilization has put into place that interferes with these mechanics is quickly becoming a major concern for conservation biology and a driving force behind environmental policy making.

Regardless of where we live in North Carolina, we all witness the grand spectacle of migration each and every year. Whether it is warblers and dragonflies in the Piedmont, hawks and monarch butterflies in the Appalachians, or whales and shore birds along the coast, our state sits squarely in the middle of one of the great migration corridors on Earth. Next spring and fall, as species you have not seen for nearly six months begin to flood back into your area, consider the epic journey that they are in the midst of and how their built in GPS technology is light years ahead of your Garmin.

Jared Lloyd of Corolla is a naturalist and photographer.

The PREDATOR PROBLEM



Written by Mark D. Jones

The quail articles I wrote for the January-February and March-April 2012 issues of *Wildlife in North Carolina* prompted numerous responses from quail hunters and enthusiasts. I was heartened that many people care about bobwhites despite declining populations and little good news in recent years. It was also encouraging that most of the letters and calls we received demonstrated our readers understand the overriding factors in the decline of quail are habitat quality and quantity.

However, there were a few readers still not convinced and promoting other reasons for the quail decline, and most of these folks identified predators as the culprit. One reader wrote, "But there is more to the issue than managing habitat. Nowhere did Jones mention depredation as a possible problem." Perhaps this reader missed the 768 words devoted to predation in the March-April issue. Given our readers' interest in predation, we thought it wise to further explore the issue.

There are many predators that eat bobwhites and their eggs. Depending how you count them, there are over 40 species ranging from ants to deer. However, these can be lumped by season, with mammalian predators being the primary bobwhite mortality source during the late spring and summer nesting season, and hawks and owls dominating during the winter and early spring. Biologists classify quail as an "r-selected species," which is a fancy way of saying they reproduce quickly to withstand heavy mortality.

This is normal and the way quail populations have always operated. This would be the opposite of "k-selected species," which reproduce slowly but live long lives (examples include bears and elephants). For r-selected animals, when reproduction, recruitment (influx of young into the population) and survival are high, the species is abundant. When one or more of these factors is low, the species fares poorly. It is normal for populations of these species to increase or decrease very quickly because they reproduce and die rapidly.

Declining habitat quality and quantity has resulted in a world where bobwhites cannot produce enough young, and recruit them into the adult population, to withstand the levels of natural mortality (including predation, disease, weather, etc.) they experience. In some areas, predation can be the most important of these mortality factors and is typically habitat-induced. For example, closed canopy forests (pine and hardwood) with shaded-out groundcover, exotic grass pastures such as fescue and Bermuda, and crop fields without fallow field borders will expose quail to excessive predation.

The commonly proposed solution to the perceived "predator problem" is to kill predators to offset the inability of bobwhites to produce the populations we desire. While predator control may have applications in very specific circumstances, it is not an easy fix, and there are at least four considerations making it a challenging tool to use: 1) legal roadblocks to killing predators such as hawks and owls, 2) public backlash from large-scale predator control to increase quail populations, 3) practicality of killing enough predators to make a difference, and 4) the moral questions of whether or not we should kill predators and which predators to kill in order to maintain or increase quail. Let's discuss each of these.

LEGAL ROADBLOCKS AND PUBLIC BACKLASH:

As discussed in March-April, state wildlife agencies must address mammals and hawks and owls separately due to legal status. States have complete legal authority over resident mammal species and can pass laws and regulations at will. However, hawks, owls and other raptors are protected by federal law rooted in the Migratory Bird Treaty Act (an international treaty, the highest form of American law). For many reasons, it is highly unlikely the federal government would grant an exemption for killing raptors

The MORAL QUESTIONS of WHETHER or NOT WE SHOULD KILL PREDATORS,

MELISSA McGAW / NCWRC

Although there are over 40 species that prey on quail, quality habitat is still paramount to rebuilding bobwhite numbers.

to increase quail populations. If an exemption were granted, quail enthusiasts and state wildlife agencies could harm relationships with conservation groups made up of hunters and non-hunters.

Many non-hunting members of these groups support hunting and share common habitat interests with hunters. Programs to kill raptors to increase quail numbers could jeopardize the support of many of these groups. Frankly, this could reduce support for all hunting and do damage from which we may never recover. All this would occur without the existence of solid data showing the control of birds of prey would even make a difference for bobwhites.

KILLING ENOUGH PREDATORS:

For most people, the more acceptable form of control involves mammalian predators. Researchers in North Carolina and Virginia (see March-April issue) in the 1990s carefully studied the removal of mammalian predators and the results for quail populations. This experiment was conducted over four years, employing eight full-time trappers. The statistically valid results were published in peer-reviewed scientific journals and widely reviewed by national experts. The take-home message from this work is that habitat improvements alone increased quail in spring, summer and fall, while the intensive removal of mammalian predators alone had little effect on quail at any time. Additionally, most landowners could not match our full-scale predator removal efforts because of costs. The level of mammalian predator control that is financially feasible for the average landowner would have little effect on predator populations. If maximum efforts we used could not increase quail, the limited efforts likely from most landowners would have even less of an impact.

Additionally, new research from Florida and Georgia shows the removal of eight species of nest predators did not reduce rates of quail nest predation. This work, recently published in the *Journal of Applied Ecology*, demonstrates that predator removal within one group of animals (mammals) may not translate to increases in quail nest success because of shifts in the types of predators responsible for nest failures.

THE MORAL QUESTIONS:

The moral questions of whether or not we should kill predators, and which predators to kill, become very complicated. Some people suggest we should kill everything that eats quail. Few hunters and wildlife professionals are willing to accept this moral position. Others view targeted predator control as a tool to add incremental increases to quail populations in well-managed habitats. This has been demonstrated effective on dozens of sites covering tens of thousands of acres in north Florida and south Georgia. These properties are well-managed habitats where mammalian nest predators are controlled during the nesting season. Predators are not eliminated despite intense effort, but predation is reduced during the quail nesting and brood rearing periods.

Research shows predator numbers are back at near-baseline levels the following year, so in order for quail populations to be increased through this form of predator control, the management must continue yearly. This is very expensive, logistically challenging and really not feasible for poor habitats or small landowners. It is important to understand this type of predator control only provides incremental increases to relatively abundant quail in already enhanced and well-managed habitats.

Some North Carolina landowners and quail hunters seem to put the proverbial "cart before the horse" and attempt to use predator control without first having adequate habitat. Without first addressing habitat, landowners chasing the predator control philosophy are distracted from the more significant quail habitat needs and given false hope. Until we create and maintain larger and higher quality habitats on most of the North Carolina landscape, predator control is likely a distraction and waste of resources. There may be a place for it on some properties, but for most properties we should focus resources on building better quail habitats that provide for many additional wildlife species. This would build partnerships with habitat-based groups and enthusiasts to reach shared goals and objectives.

We know from examples here in North Carolina and other places in the South that significantly improving the quality and quantity of quail habitats will result in increased populations of quail and many other species. Our best example here in North Carolina—corporate landholdings highlighted in the March-April issue—contain some of the highest quail densities in the South and involve no predator removal of any type. The sooner we all come together and embrace a comprehensive habitat management concept, the sooner we will move toward real opportunities to have quail populations (and associated wildlife species) on well-managed properties across the state. Supplementing high-quality habitat management with targeted and legal predator control designed to enhance the effects of habitat management can then be the decision of the individual landowner.

Mark D. Jones is supervising wildlife biologist in the NCWRC's Private Lands Program.

and **WHICH PREDATORS** *to* **KILL, BECOME VERY COMPLICATED.**

Monkey balls, space bugs, pinkleponkers—all nicknames of the woody fruit a North Carolina tree drops by the thousands. These native plants are

(Sweet) Gumball Machines

written by Julie Dunlap / illustrations and nature activity by Anne M. Runyon

Treading on its spiky fallen fruit is just one way to notice an American sweetgum. Also look for distinctive star-shaped leaves (some call the trees "stargums") and gray, ridged bark (it so resembles reptile skin, another nickname is "alligator wood"). But you may need to find an injured tree to see why Native Americans and pioneers prized these gum trees.

Male flowers

Magnolia green jumpers or *Lyssimanes viridis*

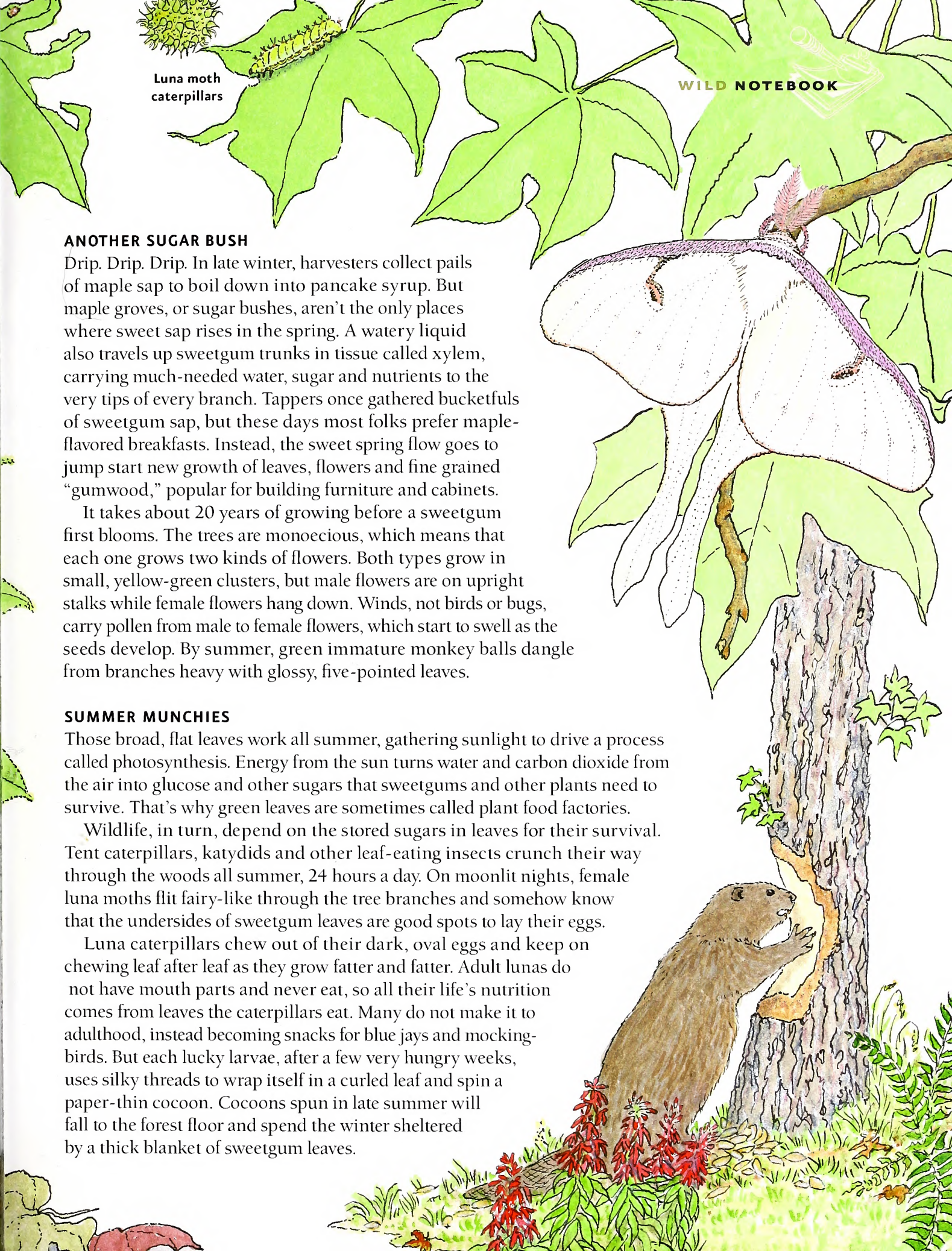
BACKWOODS BUBBLE GUM

Bear clawing or other bark damage can cause a sweetgum tree to make a sticky resin, or gum, that people once used to treat their own wounds, skin ailments and stomach troubles. And by peeling the bark, then letting the resin dry, forest-dwelling kids made honey-colored gum to chew to relieve sore throats—and just for fun.

Gum-hunters today can find American sweetgum from Connecticut to Florida and west to Texas, as well as in Central America and Mexico. Three closely-related, star-leaved species live in Turkey, China and Southeast Asia. These living sweetgums are remnants of a much larger, ancient tree family, as old as some dinosaurs. Climate changes since prehistoric times have shrunk their family's global range, but American sweetgums are still common, adaptable trees in North Carolina. They can be found in swamp forests on the Outer Banks, in suburban yards and city parks and along river valleys in the western foothills. In rich, moist soils, sweetgums may grow over 100 feet tall to join the forest canopy. They'll also spring up in logged-over woods or abandoned croplands, one of the first pioneer trees to help turn fields back into forest.

Female flowers grow into gum balls

Luna moth emerges from cocoon



ANOTHER SUGAR BUSH

Drip. Drip. Drip. In late winter, harvesters collect pails of maple sap to boil down into pancake syrup. But maple groves, or sugar bushes, aren't the only places where sweet sap rises in the spring. A watery liquid also travels up sweetgum trunks in tissue called xylem, carrying much-needed water, sugar and nutrients to the very tips of every branch. Tappers once gathered bucketfuls of sweetgum sap, but these days most folks prefer maple-flavored breakfasts. Instead, the sweet spring flow goes to jump start new growth of leaves, flowers and fine grained "gumwood," popular for building furniture and cabinets.

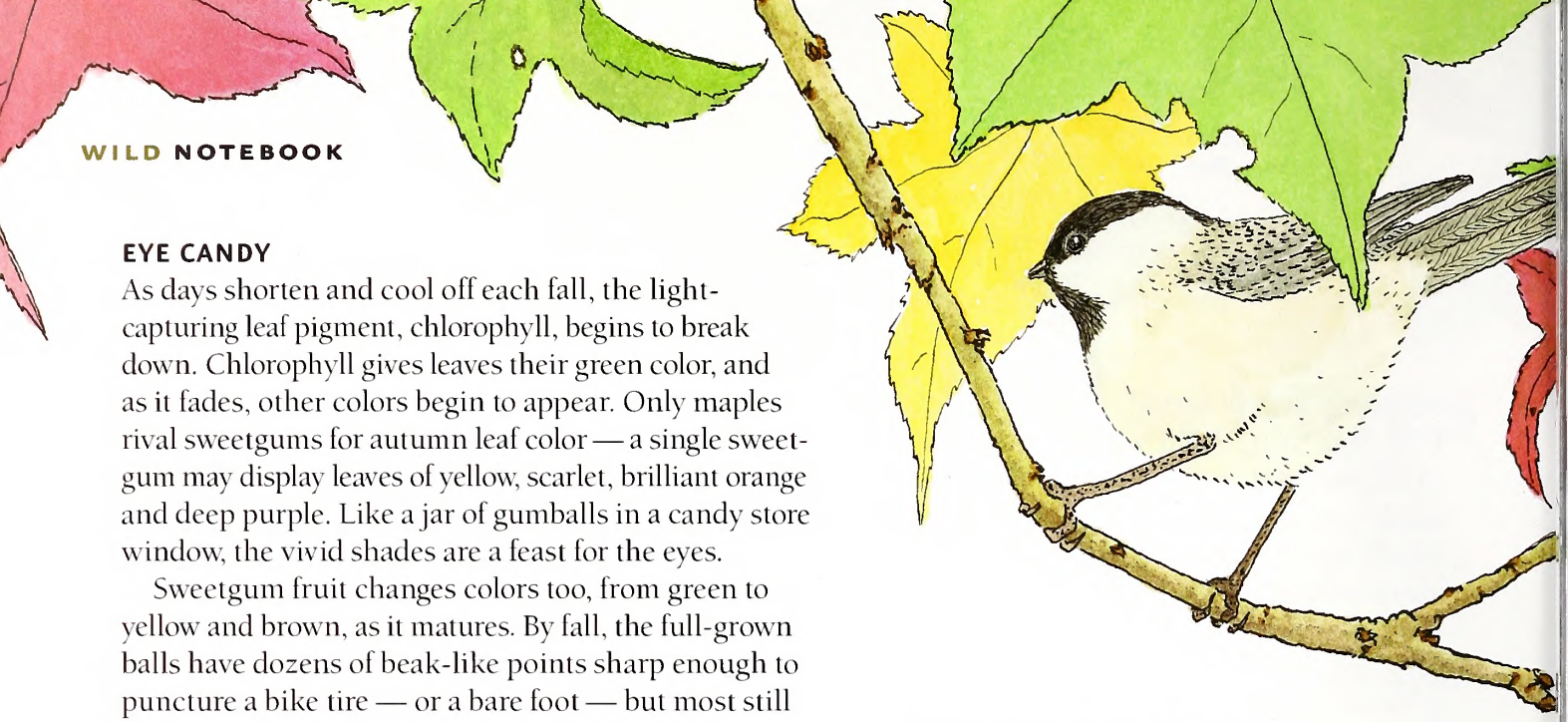
It takes about 20 years of growing before a sweetgum first blooms. The trees are monoecious, which means that each one grows two kinds of flowers. Both types grow in small, yellow-green clusters, but male flowers are on upright stalks while female flowers hang down. Winds, not birds or bugs, carry pollen from male to female flowers, which start to swell as the seeds develop. By summer, green immature monkey balls dangle from branches heavy with glossy, five-pointed leaves.

SUMMER MUNCHIES

Those broad, flat leaves work all summer, gathering sunlight to drive a process called photosynthesis. Energy from the sun turns water and carbon dioxide from the air into glucose and other sugars that sweetgums and other plants need to survive. That's why green leaves are sometimes called plant food factories.

Wildlife, in turn, depend on the stored sugars in leaves for their survival. Tent caterpillars, katydids and other leaf-eating insects crunch their way through the woods all summer, 24 hours a day. On moonlit nights, female luna moths flit fairy-like through the tree branches and somehow know that the undersides of sweetgum leaves are good spots to lay their eggs.

Luna caterpillars chew out of their dark, oval eggs and keep on chewing leaf after leaf as they grow fatter and fatter. Adult lunas do not have mouth parts and never eat, so all their life's nutrition comes from leaves the caterpillars eat. Many do not make it to adulthood, instead becoming snacks for blue jays and mocking-birds. But each lucky larvae, after a few very hungry weeks, uses silky threads to wrap itself in a curled leaf and spin a paper-thin cocoon. Cocoons spun in late summer will fall to the forest floor and spend the winter sheltered by a thick blanket of sweetgum leaves.



EYE CANDY

As days shorten and cool off each fall, the light-capturing leaf pigment, chlorophyll, begins to break down. Chlorophyll gives leaves their green color, and as it fades, other colors begin to appear. Only maples rival sweetgums for autumn leaf color — a single sweetgum may display leaves of yellow, scarlet, brilliant orange and deep purple. Like a jar of gumballs in a candy store window, the vivid shades are a feast for the eyes.

Sweetgum fruit changes colors too, from green to yellow and brown, as it matures. By fall, the full-grown balls have dozens of beak-like points sharp enough to puncture a bike tire — or a bare foot — but most still hang from branches. The "beaks" open when ripe to release up to 50 small, winged seeds that flutter to the ground. Seeds from trees on river banks may be nabbed by mallard ducks, while wild turkeys peck up seeds falling in an upland forest. And sweetgums offer another treat for your eyes when seeds falling in your yard attract Carolina wrens, Carolina chickadees and other neighborhood birds.

GOODY-GOODY GUMBALLS

Wildlife may find sweetgum tastiest of all in winter. Hundreds of gumballs still hang on the tree, where finches use their tough beaks to tear inside. Chipmunks, mice and other rodents can dig fallen balls out of snow banks and gnaw out leftover seeds. Cold, hungry deer browse on twigs of young saplings, and rabbits nibble on tender young bark. Sweetgum in winter is a favorite food of beavers, who strip bark off of large trees or chew through thinner trunks. And unless the weather's freezing, leaf litter feeds worms, pill bugs, millipedes and other critters of the forest floor. Thanks to such decomposers, the leaves turn back into soil nutrients that all forest plants need to grow. Now that is sweet!

Get Outside

Make sweetgum treats. Peeling bark to gather resin for chewing gum can damage trees, but you can make sweetgum treats for other animals. In late fall, gather a bucketful of pinkelponkers (Careful! You may want to wear thick gloves). Tie a long cotton thread to each stalk, then scoop peanut butter onto the fruits. Roll the balls in sunflower seeds and hang them in a tree for birds and squirrels to enjoy. Sweetgum leaves are tasty, too, to the critters that live in your compost bin, so rake some up and pile them high for worms and pill bugs to dine on all winter. But letting some sweetgum leaves lie where they fell all winter is also a good idea; that leaf litter may be sheltering insect cocoons. When luna moths emerge next spring, they'll make a treat for your eyes on moonlit nights.

Read and Find Out

- "A Field Guide to Medicinal Plants and Herbs of Eastern and Central North America" by Steven Foster and James A. Duke, Houghton Mifflin, 2000.
- "Teaching the Trees: Lessons from the Forest" by Joan Maloof, University of Georgia Press, 2007.
- "The Sibley Guide to Trees" by David A. Sibley, Knopf, 2009.

On the Internet:

- National Phenological Network usanpn.org
- North Carolina Arboretum ncarboretum.org

Find out more about Project WILD Workshops and literature at the Wildlife Commission's website at ncwildlife.org.

The Wildlife Endowment Fund

An Investment for the Future

Established in 1981, the Wildlife Endowment Fund allows the Wildlife Resources Commission to accept tax-deductible contributions for wildlife conservation. Money from the sale of lifetime licenses is also placed in this fund. Your donation or purchase will ensure that North Carolina will have a rich wildlife heritage for generations to come.

Lifetime License Form

Infant and Youth *(check appropriate block)*:

- ☐ Sportsman Infant $200
  (under 1 year old—Application must be received before applicant has attained 1 year of age.)
- ☐ Unified Sportsman/Coastal Recreational Fishing Infant $275
  (under 1 year old—Application must be received before applicant has attained 1 year of age.)
- ☐ Sportsman Youth $350
  (ages 1 through 11—Application must be received before applicant has attained 12 years of age.)
- ☐ Unified Sportsman/Coastal Recreational Fishing Youth $450
  (ages 1 through 11—Application must be received before applicant has attained 12 years of age.)

A copy of the birth certificate must accompany applications for infant and youth licenses. Birth certificate documentation cannot be returned.

Note: Pending satisfactory completion of the hunter safety course, persons who possess infant or youth licenses may exercise the privileges thereof when accompanied by an adult who is properly licensed to hunt in North Carolina. "Accompanied" is defined as maintaining a proximity to the hunter which enables the adult to monitor the activities of, and communicate with, the hunter at all times.

Adult (age 12 or older) *(check appropriate block)*:

- ☐ Comprehensive Inland Fishing $250
  (N.C. residents only—includes basic inland fishing, trout & trout waters an game lands)
- ☐ Comprehensive Hunting $250
  (N.C. residents only—includes basic hunting, big game, game lands & N.C. waterfowl)
- ☐ Sportsman $500
  (N.C. residents only age 12 or older—includes basic hunting & inland fishing, big game, game lands, trout & N.C. waterfowl)
- ☐ Coastal Recreational Fishing $250
  (N.C. residents only—includes coastal recreational fishing)
- ☐ Unified Sportsman/Coastal Recreational Fishing $675
  (N.C. residents only—includes same privileges as the Spartsman, plus coastal recreational fishing)

A federal waterfowl stamp must be purchased separately for all N.C. hunting licenses.

Note: On or after July 1, 1991, a person, regardless of age, may not procure a hunting license or hunt in North Carolina without producing a certificate of competency for completing the hunter safety course or a hunting license effective prior to July 1, 1991, or by signing the statement below that he or she had such a license.

Check appropriate block and attach required copy:

- ☐ Copy of Prior Year Hunting License
- ☐ Copy of Hunter Safety Certificate of Competence
- ☐ In lieu of copy, I am signing the statement below:

Statement: I certify that I was a licensed hunter prior to July 1, 1991.

Signature _____ Date _____

Visit us online at www.ncwildlife.org or call 1-888-248-6834 for a complete list of lifetime licenses, including those for nonresidents and 65 and older.

Lifetime License

Complete the following information if applying for a lifetime license. Be sure to check appropriate block(s) on reverse side *(please print legibly)*:

Name of Applicant _____

Daytime Phone _____

Mailing Address _____

Resident Address _____

County _____ Date of Birth _____ Driver License # _____

E-mail Address _____

Is this license a gift? ☐ Yes ☐ No If yes, mail license to ☐ Donor or ☐ Applicant.

License Donor's Name *(if applicable)* _____

Donor's Telephone # _____

Donor's Mailing Address _____

City _____ State _____ Zip _____

Method of Payment: ☐ Check ☐ VISA ☐ MasterCard

Acct. # _____ Expires _____

Print name exactly as it appears on credit card _____

Cardholder's Signature _____ Date _____

Personalize your Lifetime License for an additional $5:
Indicate your selection of letters, numbers, dashes, periods, commas and /or blanks up to 6 spaces: ___ ___ ___ ___ ___ ___

Indicate your personal message including letters, numbers, dashes, periods, commas and /or blanks up to 21 spaces:

___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___

___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___

Signature of Applicant or Donor _____ Date _____

Note: Only adult lifetime licenses may be purchased by phone or online (VISA or MasterCard only). Call toll-free (1-888-248-6834) or visit us at www.ncwildlife.org. Use this form to purchase infant and youth lifetime licenses by mail.

Tax-Deductible Contribution

☐ I wish to make a tax-deductible contribution to the Wildlife Endowment Fund. Enclosed is my check for $_____. ***(Credit card payments cannot be accepted.)***

Name _____

Daytime Phone _____

Mailing Address _____

City _____ State _____ Zip _____

Make checks payable to: *Wildlife Endowment Fund*

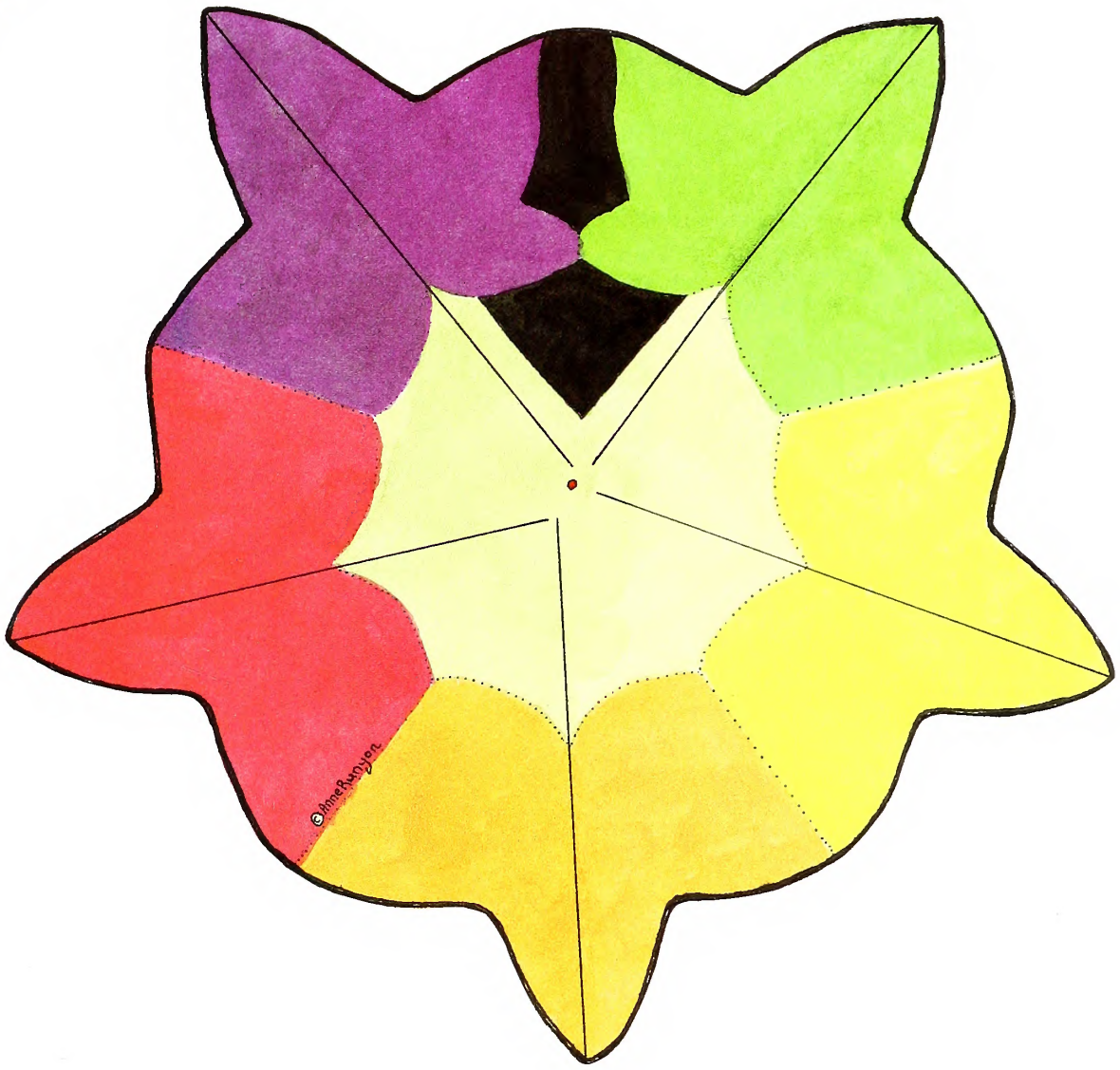
Transactions are not considered final until the check has cleared the bank. Items purchased with a returned check will be made invalid. A service charge of up to $25 will be charged on any returned check. (N.C.G.S. 25-3-506)

Mail completed application and payment to:
NCWRC, License Section, 1707 Mail Service Center, Raleigh, NC 27699-1707

Office location: *NCSU Centennial Campus, 1751 Varsity Drive, Raleigh, N.C. 27606*
Telephone: 1-888-248-6834 (2HUNTFISH)

Sweet Gum Leaf Pinwheel

A STARRY SWIRL OF FALL COLOR



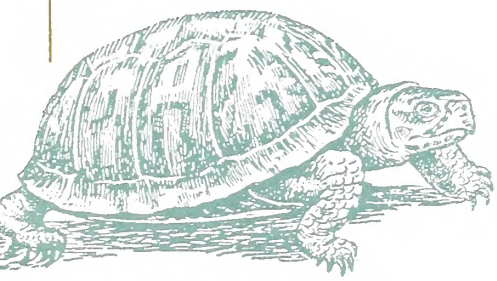
1) Cut out the pentagonal shape along the black outline.
2) Starting at the purple tip, fold down along the black line. (Creating a small mountain fold.)
3) Repeat for red, orange, yellow and green tips. (Creating a sort of loose umbrella shape.)
4) Holding the purple tip folded, lay it against the red folded tip. Press to create a valley fold between them, and hold them together.
5) Repeat for orange and for yellow.
6) Pinching all four colors together, line them up along their black lines. Add the green to the bottom of the stack.
7) Pinch and line them all up as evenly as you can. Hold the stack together tightly, and cut out the two black areas. (You will be cutting through 10 layers of paper, so use sharp scissors!)
8) Unfold and place a pencil point under the red dot to balance your pinwheel. Pinch pinwheel down on pencil point slightly, and blow gently to spin.

Commission Programs Include Turtle Dogs

It's not often you hear a Boykin spaniel handler shout "find the turtle," but that was Kim Burge's command during a summer outing at Lake Raleigh Woods. Burge, a wildlife education specialist at the Centennial Center for Wildlife Education in Raleigh, had a group of eight people on her Family Turtle Tracking with Dogs, one of the on-site programs for general public.

John Rucker, a retired high school teacher and avid conservationist and hunter in Tennessee, first discovered about 12 years ago that his Boykin spaniel loved to retrieve box turtles. Rucker eventually bred a line of Boykins just for turtle searching. Through mutual friends, Burge met Rucker and last summer "borrowed" two dogs to do box turtle research in North Carolina. She did it again this summer and the program has been quite a hit with the public.

"I have loved box turtles since I was a child growing up in Maryland, and I jumped at the opportunity to be able to participate in the turtle tracking workshop," said Joanne St. Clair, who is an environmental educator at White Deer Park in Garner and also the education chair for the N.C. Herpetological Society. "I am interested in the mark-recapture study that Kim is doing using these specially-trained dogs and I loved seeing them in action! The dogs' noses are able to find many more turtles in a shorter amount of time than just people can, which can give us a more accurate picture of the box turtle population in a given area."



MIKE ZLOTNICKI / NCWRC

Kim Burge, kneeling, is shown with a group who participated in a Family Turtle Tracking with Dogs outing last summer.

St. Clair also noted that the Eastern box turtle is North Carolina's state reptile.

Burge watches the dogs so she can mark where they find the turtles. She then records time, air temperature, GPS reading and other data. She will also measure, sex, estimate age, mark with a file, label with a letter sequence and photograph each turtle. "Their shell patterns are like fingerprints," she said.

Burge keeps digital maps of turtle movement over time. One specimen, AHK, was hit by a car 1.25 miles from his initial spot. One radio telemetry turtle kept a home range of only about 2 acres. Still, the dogs steal the show.

Heather Hildebrandt, her husband Mike and sons Braden and Gavin weathered the rain to see the turtle gathering.

"I thought it was just great," she said. "We have box turtles in the backyard. I was never the kind of girl who played with dolls. We're always trying different ways to enjoy nature with the kids."

Family Turtle Tracking with Dogs is but one of many interesting programs available to the public through the Commission's four Education Centers. Others include digital photography for children and adults, Piedmont habitat programs, fly-fishing classes, deer hunting clinics and more. Go to ncwildlife.org/Learning/EducationCenters to learn more.

e NEWSLETTER

Get N.C. Wildlife Update—news including season dates, bag limits, legislative updates and more—delivered to your Inbox from the N.C. Wildlife Resources Commission. Sign up at www.ncwildlife.org/enews.

Rare Fish Discovered in Chowan River Basin

Biologists with the N.C. Wildlife Resources Commission made an exciting discovery last May, finding a rare minnow in the Deep Swamp Branch in Hertford County.

The discovery on May 1 by Tyler Black, a fisheries biologist, and Michael Young, a fisheries technician, marks the first time the bridle shiner has been found in the Chowan River basin in North Carolina. The tiny minnow, which rarely exceeds 2 inches, was last seen in a section of the Chowan River basin in Virginia in the late 1960s. Until last month, the bridle shiner was thought to be extirpated from the Chowan River.

Black and Young found the shiner while sampling for another rare aquatic animal, the Chowanoke crayfish. Although they weren't looking for shiners specifically, they recognized the lone fish immediately by its distinctive black band, which runs from the tip of its snout down the length of its body. They knew that finding it was an extraordinary "needle in the haystack" discovery that doesn't happen often during a biologist's career.

"Realistically, it is more like finding a specific needle in a stack of needles because we frequently collect other species of shiners that closely resemble the bridle shiner," Black said. "This discovery puts the bridle shiner back on the radar for the Chowan River basin and speaks volumes to the importance of conducting contemporary distribution surveys."

While they searched for additional shiners that day, they were unable to find any. However, they are excited about the discovery because it extends the known distribution of bridle shiners in North Carolina. They remain optimistic that they will find more bridle shiners in the Chowan in future surveys.

The bridle shiner's historic range spans from Lake Ontario in Canada to the Santee River in South Carolina. However, in North Carolina, the bridle shiner has been found only in the Neuse River and not since 2001. In fact, the bridle shiner has declined throughout much of its historic range, with most states listing the species as vulnerable, imperiled, threatened or endangered. In North Carolina, it is listed as state endangered.

Now that a bridle shiner has been verified in North Carolina, biologists plan to conduct a follow-up survey in the Deep Swamp Branch and surrounding water bodies later this summer to determine the extent of the Chowan River population in North Carolina. Survey work for aquatic nongame wildlife is supported through donations made to the Nongame and Endangered Wildlife Fund.

Find out more about nongame and endangered wildlife by visiting the Wildlife Resources Commission's Conserving page.

Commission biologist Tyler Black and fisheries technician Michael Young discovered the bridle shiner while searching for the rare Chowanoke Crayfish.

2012 Waterfowl Conservation Stamp and Print Available

"Redheads in Needlerush," the 2012 North Carolina Waterfowl Conservation Stamp and Print, are available through the N.C. Wildlife Resources Commission's N.C. Wild Store.

Signed and numbered regular edition prints with mint stamps will sell for $145. The collector's mint stamp will sell for $10.

The acrylic artwork depicting a pair of brilliantly colored redhead ducks was painted by Delaware artist Richard Clifton. "Redheads in Needlerush" marks the second year in a row Clifton has won North Carolina's waterfowl conservation stamp and print competition. He took top honors last year with his vivid portrayal of a pair of Canada geese standing in a pasture.

Proceeds from sales of the print and stamps will go to the commission's Waterfowl Fund, which generates revenue for the conservation of waterfowl habitat in North Carolina. The money is used to help North Carolina meet its financial obligations in implementing the North American Waterfowl Management Plan, the international agreement helping restore waterfowl populations throughout the continent. In addition, funds can be used to support waterfowl research and to buy equipment used to manage wetlands.

To purchase a print and mint stamp or for additional information, call the Wildlife Resources Commission toll-free at 866-945-3746, or visit the agency's online N.C. Wild Store, ncwildstore.com.

Franc White Passes On

Franc White, producer of the iconic Southern Sportsman television show, died June 6 at his home in Hookerton. He was 85.

The Southern Sportsman ran from 1972 to 1996. With his Irish setter Fracas at his side, White was the face of the outdoors for a generation of southern outdoorsman. His zebra-striped plane was a familiar sight to viewers of his show. He ended each show with his catch phrase "Do yourself a favor, take a kid fishing."

According to the obituary in *The News & Observer* of Raleigh, he wanted his ashes and those of Fracas to be strewn in the Linville River so the trout and smallmouth bass "can get even."

A fund was created in his memory, the Franc White Legacy Fund for Conservation Education. Contributions can be sent care of N.C. Wildlife Federation, 1024 Washington St., Raleigh, 27605 or online at ncwf.org/support/honor.php. To watch an archived video of Southern Sportsman, scan the QR code with your smart phone.

CALENDAR OF EVENTS

FRIDAY–SUNDAY, SEPT. 7–16

The N.C. Mountain State Fair celebrates the people, agriculture, art and tradition that make our region great. Go to mountainfair.org for details.

SATURDAY–SUNDAY, SEPT. 8–9

Learn about the wildlife heritage of Currituck at the ninth annual Currituck Wildlife Festival at Currituck County High School in Barco. Show features decoy carvers, wildlife painters, exhibits and decoy collections. Contact jmurray@delreysys.com.

SATURDAY, SEPT. 15

Come join fans of arthropods at BugFest at the N.C. Museum of Natural Sciences in Raleigh. Go to presentations, eat some tasty dishes featuring creepy crawlies at Café Insecta. Children under 16 must be accompanied by an adult. Pre-registration required. Visit naturalsciences.org for more information.

SATURDAY, SEPT. 22

Celebrate National Hunting and Fishing Day at one of the commission's four Education Centers across the state. For more information go to ncwildlife.org/Learning/EducationCenters.aspx.

FRIDAY–SUNDAY, OCT. 5–OCT.7

Check out the local seafood and entertainment at the 26th Annual N.C. Seafood Festival in Morehead City. Go to ncseafoodfestival.org.

THURSDAY-SUNDAY, OCT. 11–21

Enjoy the N.C. Wildlife Resources Commission exhibits—including a shooting range, mobile aquarium and Sensory Safari—plus craft demonstrations, livestock exhibits, midway games and rides, concerts, food and more at the N.C. State Fair in Raleigh. Visit ncstatefair.org.

SATURDAY, OCT. 20

The Women's League of Mount Airy, in partnership with the NWTF, Trout Unlimited and the N.C. Wildlife Federation, will present the inaugural Mt. Airy Fly Fishing Expo. Artists, vendors, fly-fishing demonstrations, food and more. At Riverside Park from 9 a.m.–4 p.m.

Readers should check with the contact listed before traveling to an event. Items for listing should be conservation-oriented and should be submitted at least four months in advance to mike.zlotnicki@ncwildlife.org, or call 919-707-0175.

Public Hearings Scheduled for September

The public is invited to comment on proposed changes in wildlife and fisheries management rules. The schedule for the public hearings is below. Public hearings begin at 7 p.m.

DATE	DISTRICT	CITY	LOCATION
Sept. 11	4	Dublin	Bladen Community College
Sept. 12	5	Graham	Courthouse
Sept. 13	6	Norwood	South Stanly High School
Sept. 18	8	Murphy	Tri-County Community College
Sept. 19	9	Morganton	Municipal Auditorium
Sept. 20	7	Wilkesboro	Wilkes Community College
Sept. 25	1	Edenton	Swain Auditorium
Sept. 26	2	New Bern	Courthouse
Sept. 27	3	Rocky Mount	Nash Community College

Becoming an Outdoors-Woman Schedules Two September Events

The N.C. Wildlife Resources Commission will offer two special outdoor skills sessions for women in September through its Becoming an Outdoors-Woman program. On Sept. 8–9, an overnight Outdoors Skills session for the mountains region will be held at Fort Hamby campground, W. Kerr Scott Lake near North Wilkesboro. This two-day workshop will help participants master skills and gain confidence in archery, basic fishing and tracking and wildlife identification. Saturday lunch and Sunday continental breakfast will be provided, with campers responsible for their own supper on Saturday. Participants bring their own tent and sleeping gear. Workshop staff will be on hand to assist in setting up camp. Fort Hamby campground has grills and potable water, and restaurants are nearby. A $50 fee covers overnight camping, instruction, session materials and two meals.

Registration is open to women ages 18 and older, on a first-come, first-served basis. Partial scholarships are available.

On Sept. 15, an Outdoors Skills session for the Piedmont region will be held at Lake Townsend, a Greensboro Parks & Recreation area. This one-day workshop will help women master skills and gain confidence in archery, aquatic wildlife identification, basic fishing and motorboat skills. Snacks and water will be furnished. Participants should bring a bag lunch. Cost is $25 per attendee, with all equipment provided, though participants may bring their own if they prefer.

MELISSA McGAW/NCWRC

BOW annually provides safe, expert instruction in a variety of outdoor skills, including fishing, hunter safety, target shooting, archery, canoeing, motorboat safety, outdoor cooking, tracking and map-and-compass. For more information contact BB Gillen at 919-218-3638 or bb.gillen@ncwildlife.org.

How Do Pufferfish Puff?

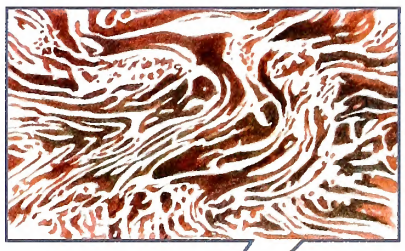
written by Clyde Sorenson
illustrated by Jim Brown

THE PUFFERFISH'S ABILITY TO RAPIDLY INFLATE ITSELF with water or air confounds predators and fascinates us. A number of special adaptations allow the fish to accomplish this surprising feat of self-defense.

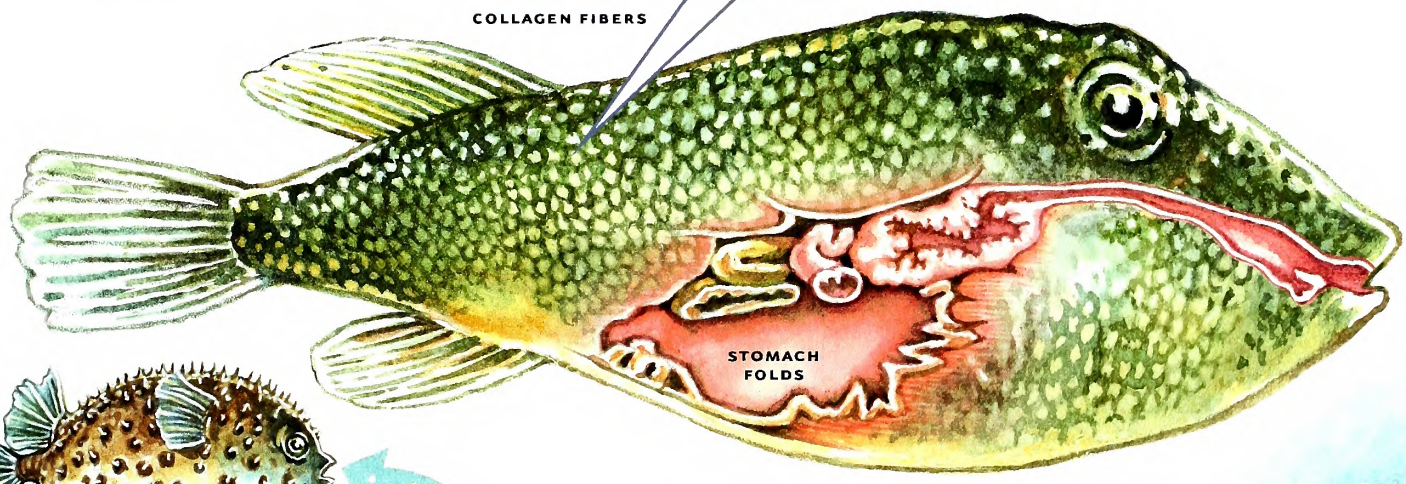
PUFFERFISH SKELETON

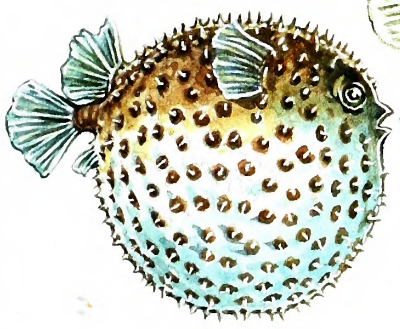
Unlike most fish, but like its relatives the triggerfish, a puffer has no ribs to get in the way of its inflation. It also doesn't have a pelvic skeleton and the fins attached to it, and its backbone is particularly flexible in the vertical plane.

As in most vertebrates, fibers of collagen reinforce the skin of the puffer. But unlike most animals, the collagen fibers in puffers have microscopic folds that extend as the stomach volume grows, so the skin doesn't restrict expansion.



COLLAGEN FIBERS

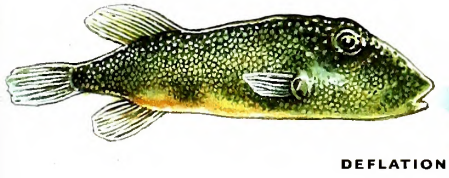




INFLATION

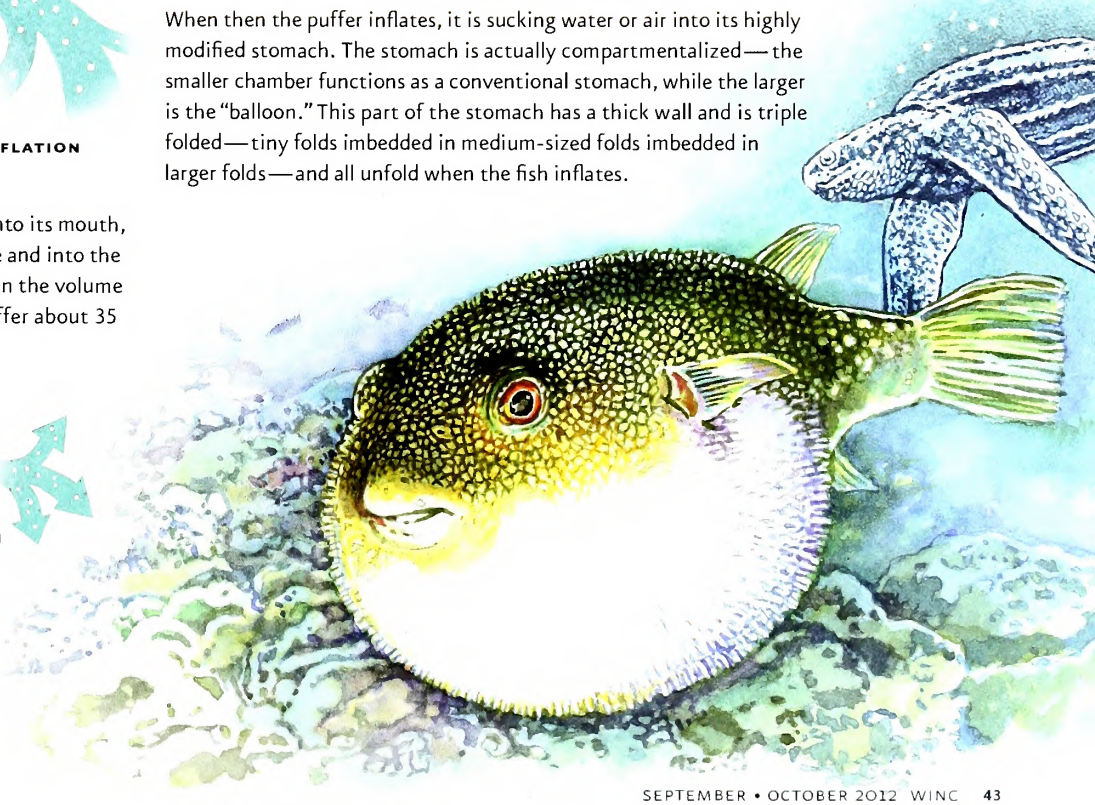
When then the puffer inflates, it is sucking water or air into its highly modified stomach. The stomach is actually compartmentalized—the smaller chamber functions as a conventional stomach, while the larger is the "balloon." This part of the stomach has a thick wall and is triple folded—tiny folds imbedded in medium-sized folds imbedded in larger folds—and all unfold when the fish inflates.

The puffer inflates by rapidly sucking water into its mouth, where special muscles force it through a valve and into the stomach. That flexible backbone plays a role in the volume of water each gulp can move. It takes the puffer about 35 gulps to fully inflate in about 15 seconds.



DEFLATION

So, what happens when the danger passes? The puffer has two layers of muscles under its skin that help force the water back out.



Attack on Bermuda

written by Jim Dean

In early June, my son-in-law Thomas Richardson and grandson John and I sailed down Chesapeake Bay in my 42-year-old sailboat to watch *The Blue Angels* off Virginia Beach; then we sailed to Hampton Roads and Norfolk to see the tall ships. En route, we spent a night in a marina next to the naval base at Little Creek just west of the bay bridge and tunnel.

ILLUSTRATION BY JACKIE PITTMAN

This stretch of beach is highly developed now—nothing like the desolate sandy beaches and low dunes I remembered 60 years ago. But somewhere along here in 1952 when I was 12, I was one of a group of Boy Scouts who took part in an unlikely Naval amphibious training exercise on this beach.

I don't know whose idea it was to invite contingents of The Boy Scouts of America aboard Navy ships for a two-week cruise, or if this was a routine practice, but the Navy's good will gesture would make a favorable impression – and may even have garnered some later recruits. Yet, before it was all over, I suspect some sailors must have had second thoughts about sharing their ship with a rambunctious group of kids.

"As for Bermuda, we didn't get more than 100 miles off the coast of the United States, and I never did know why Bermuda was going to be our intended destination anyway."

At Little Creek, half a dozen wooden 36-foot Higgins LCVP landing craft were launched off the 492-foot *USS Cambria* (APA-36) attack transport, and we climbed down the nettings on the side of the ship into the boats and motored to the beach where the steel front ramps dropped and we swarmed ashore with imaginary rifles ready for action. Fortunately, we met no resistance, which was certainly not the case in the Pacific Theatre in World War II where the *Cambria* took part in landings in the Marshall Islands at Kwajalein and Majuro, and at Leyte, the Marianas, Luzon and Okinawa. Similar ships conducted landings with equally bloody loss of life in such places as Iwo Jima, Guadalcanal and in the Atlantic at Normandy.

Initially, we were told that *Cambria* would be going to Bermuda after conducting gunnery training and amphibious landings. Some Scouts even brought a rod and reel in hopes of fishing at this British island paradise. Even after those plans changed, we were hardly disappointed.

After securing the desolate beach at Little Creek, we watched gunnery exercises with live ammunition. Anti-aircraft guns fired 20mm and 40mm rounds at targets towed by small aircraft, and 5-inch shells were lobbed at floating targets. Throughout the trip, we learned Morse code, knot tying and other naval skills. It was one of the most memorable times of my life, and I am certain every Scout on that trip would agree.

The sailors on *Cambria* were a patient and good-natured bunch even though we swarmed the ship like rats from the bilges to the bridge when we weren't kept busy. We found canned C-rations dated 1942 deep in the hold (and ate them). Somebody passed around a well-worn typed manuscript of a risqué novel that proved endlessly fascinating to our not-so-innocent eyes. We gathered up all the empty brass shells we could carry and hid them in our duffle bags until the word came down that we had to relinquish them. I was in on all of it, but I also spent many spare hours on the signal bridge where kindly sailors taught me semaphore using flags to spell out the alphabet.

Back in Norfolk, we spent several days moored at a dock between the escort carrier USS *Valley Forge* (CV-45), and a vintage submarine whose name I have forgotten. We attended church services in the carrier's massive hold where the aircraft had been stored (they were no longer on board), and played football on the wooden flight deck.

In 1956, a movie, "Away All Boats," was made about the critical role attack transports played in World War II. Jeff Chandler played the captain. I remember seeing it and being pleased to know that I had explored nearly every inch of such a ship. Years later, I found a Revell plastic model of an attack transport in a hobby shop and bought it for $2. One of these days I'll get around to building it the way I remember *Cambria* — gray, rusty and battle scarred. It will look great mounted in the cabin on my old sailboat.

As for Bermuda, we didn't get more than 100 miles off the coast of the United States, and I never did know why Bermuda was going to be our intended destination anyway. Surely, the Navy didn't plan to deploy us in landing craft on those pristine beaches.

On our last day in Norfolk, we packed up our duffle bags and filed down the gangway to the dock where our parents were waiting. They were glad to see us, and I suppose we were glad to see them, although I confess I looked longingly up at the massive steel sides of the ships that had made such a lasting impression. Then, too, some of us were a little nervous, fully expecting to be searched for contraband brass.

If the sailors who joined us for a final goodbye were glad to get their ship back, they didn't show it, but I hope they didn't really need that empty 40mm shell I wrapped in my dirty underwear and smuggled ashore.

TODD PUSSER

Mourning dove chick

OUTDOOR MOMENT

IN THE NOVEMBER · DECEMBER ISSUE

JARED LLOYD

VISITORS FROM THE NORTH

For the past decade, increasing numbers of harbor seals have begun showing up on the North Carolina coast in winter.

SALT-CURED

It would be hard to find a saltwater angler unfamiliar with Jerry Dilsaver, a man who has spent his life fishing and teaching others how to do it.

FISHING THE AUTUMN SURF

Noted fishing writer Stan Ulanski discusses the hows and whys of surf fishing the Outer Banks.

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